Vol. 50 No. 4 April 1957

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of the

National Fire Protection Association

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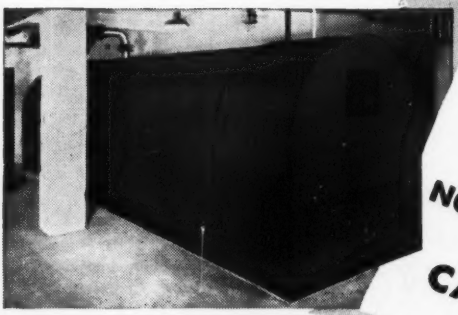

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Vol. 50 No. 4 April 1957

Quarterly

The Standard Technical Journal of Fire Protection for More Than Forty Years

The NFPA is a non-profit technical and educational organization devoted to the reduction of loss of life and property by fire with a total membership of nearly 17,000. The *Quarterly* is one of the publications regularly provided to members. Other membership publications include *Fire News*, *Advance Reports* to the Annual Meeting, a *Year Book*, and many leaflets, pamphlets and posters issued throughout the year on fire prevention and control. Six volumes of the National Fire Codes are available on an annual subscription basis, one volume free and others at reduced membership rates. For full details on available material ask for the free "List of NFPA Publications."

NFPA annual dues are $12.50 for Associate Membership of which $5.00 is for subscription to this Journal. National and regional societies or associations may apply for an organization membership for which annual dues are $100; such a membership entitles four individuals to receive the periodical membership publications.

Technical committees of the Association develop means to safeguard life and property through the publication of standards covering all phases of fire prevention and protection. Your membership in the Association affords an opportunity to keep abreast of these developments and, by being a member, you help support this humanitarian activity. Popular educational literature on fire safety is constantly being produced by the NFPA for distribution through its members to the general public.

National Fire Protection Association

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Quarterly

of the

NATIONAL FIRE PROTECTION ASSOCIATION

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Articles and accounts of fires appearing in the Quarterly are based on material forwarded to the Association. The Association, as a body, does not assume responsibility for the accuracy of the material printed herein.

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St. Louis Post Dispatch

Seventy-two patients at the Katie Jane Nursing Home, Warrenton, Missouri were killed by fire that destroyed the 2-story brick, wood-joisted building on February 17, 1957. Grossly substandard exit facilities, absence of sprinkler protection for the combustible building and lack of an emergency evacuation plan were among the more flagrant violations of nursing home fire safety responsible for these deaths. A detailed report of the fire was published in the March issue of the NFPA Fire News.

Meeting of Board of Directors

New York, January 24, 1957

Present

Richard E. Vernor, Chairman
John A. Neale, President
Henry G. Thomas, Vice President
Loren S. Bush, Vice President
Allen L. Cobb, Past President
T. Seddon Duke, Past President
Hovey T. Freeman, Secretary-Treasurer

Warren J. Baker	A. Leslie Ham
Malcolm S. Blake	Leonard Peterson
A. L. Brown	J. Sharp Queener
Charles H. Bunn, Jr.	Elmer F. Reske
E. Kenneth Clark	Leigh R. Sanford
Franklin R. Fetherston	Roger H. Wingate
W. H. Forristall	Udell C. Young

Percy Bugbee, General Manager; Robert S. Moulton, Technical Secretary; Horatio Bond, Chief Engineer; Charles S. Morgan, Assistant General Manager; George H. Tryon, Assistant Technical Secretary; Merwin M. Brandon, Chairman, Electrical Section.

During part of meeting, members of Nominating Committee: W. G. Schultz; Stanley F. Spence; Hubert Walker.

1. Chairman Vernor welcomed Mr. Forristall to membership on the Board.

2. Mr. Bugbee and Mr. Morgan reported plans for the 1957 annual meeting in Los Angeles which were approved.

3. Mr. Bugbee reported tentative plans for future annual meetings as follows: 1958, Chicago; 1960, Montreal; 1961, Detroit; 1962, Philadelphia. For 1959 he reported that tentative plans for holding the meeting in the Hotel Statler, New York, May 18–25, had been handicapped by demand for a charge by the hotel for meeting rooms and for NFPA commitment as to the exact space to be used. He also reported that invitations had been received from two satisfactory hotels in Atlantic City. Final selection of the place of the 1959 meeting was referred to Mr. Bugbee with power.

4. Treasurer Freeman's report on current finances was approved.

Staff Activities

5. Reports on NFPA activities were presented as follows:

a. Mr. Bugbee reported on membership, indicating a continuing growth and present membership of 16,690, higher than at any time in the Association's history. He mentioned the continuing energetic campaign conducted by the Membership Committee under the chairmanship of H. E. C. Rainey.

b. Mr. Bugbee reported on the Field Service Sponsors Committee, made up of outstanding leaders in business and industry.

c. Mr. Moulton reported on Publications, with 40,998 individual orders for publications received during 1956 as compared with 34,231 in 1955. He reported that 5,393,749 items of Fire Prevention Week literature had been distributed in 1956 and outlined other items of the publications program.

d. Mr. Morgan reported on Advertising, indicating a continuing growth and satisfactory developments of this phase of the Association's activities.

e. Mr. Bugbee reported on the Public Relations Department and the Fire Prevention Week Contest, indicating the tremendous volume of reports and the widespread interest. He reported that the International Association of Fire Chiefs had voted to present plaques to the winning cities in the United States and Canada, in addition to the NFPA plaques now donated. This report was discussed by Mr. Ham, Mr. Neale and Mr. Duke.

f. Mr. Bond discussed the widespread activities of the Fire Services Department.

g. Mr. Moulton presented a summary of the activities of the Fire Record Department.

h. Mr. Brandon, Chairman of the Electrical Service Committee, discussed the activities of the Electrical Field Engineer.

i. Mr. Bunn, Chairman of the Committee on Flammable Liquids Field Service, discussed the activities of the Flammable Liquids Field Engineer.

j. Mr. Fetherston, Chairman of the Gases Field Service Committee, reported on the activities of the Gases Field Engineer.

All of the above reports were approved, with expression of appreciation for the value of the services performed.

Activities of NFPA Sections

6. a. Mr. Morgan, Executive Secretary, reported on the Fire Marshals' Section activities and distributed copies of typical publications of the Section.

b. Mr. Brandon, Chairman, reported on the Electrical Section, and mentioned a plan to have the 1957 Section meeting deal with electrical inspection problems.

c. Mr. Reske, President, reported on the activities of the Society of Fire Protection Engineers, indicating a membership of 980, an increasing number of Chapters and a healthy financial condition. Mr. Reske reported on the conclusion of a subcommittee, consisting of himself, Mr. Baker and Mr. Duke, appointed at the last meeting, to consider the problem of some form of reduced rate NFPA membership for students. The subcommittee indicated the complications involved, voted to recommend no action at this time, and requested that they be discharged. This report was adopted, and the subcommittee was discharged with an expression of appreciation for their services. Mr. Reske reported on the formation of a Student Chapter of the Society of Fire Protection Engineers at the Illinois Institute of Technology, which had been sponsored by the Chicago Chapter of the Society. He indicated the need for keeping members of the Student Chapter informed through regular receipt of Fire News. This was referred to the NFPA office to work out in collaboration with the Chicago Chapter.

St. Louis Meeting

7. The 1956 Fall Conference in St. Louis was discussed by Messrs. Vernor, Cobb, Baker, Fetherston, Neale, Duke, Ham, Brown, Reske and Thomas. It was agreed that this was the best fall meeting held to date, and that such meetings have great value and should be continued. The selection of a place and date for the 1957 Fall Meeting was referred to the NFPA staff with power.

"Sparky" Campaign

8. The Advertising Council campaign, Sparky Enterprises and Sparky's Fire Department were discussed by Mr. Bugbee. He reported that last year he had secured a reversal of the Advertising Council's vote to drop the Sparky Campaign, and expressed hope that he might again be successful in securing a reversal of their recent vote against dropping the campaign. Discussion indicated that never before in the Advertising Council's history had any of their votes been reversed. It was agreed that the Sparky Campaign should be continued.

Technical Committee Work

9. Mr. Moulton reported on Technical Committee Activities, indicating the large amount of devoted service rendered by committee chairmen and members. After discussion it was voted to express the appreciation of the Board for this service through suitable letters to those concerned and to their superiors and Associations where appropriate.

NFPA Financial Needs

10. Pursuant to the vote of the Board at the July 1956 meeting of the Board of Directors, the General Manager presented to the Board the following statement indicating the financial needs of the Association, including needs for additional staff for more effective work.

In the fifteen-year period, 1942–1956, we have increased our total income from $170,000 to approximately $800,000; an average increase of about 10 per cent per year. During this period we have spent most of our receipts to meet the pressing needs of the Association. We have had a slight margin except in the years 1947, 1955 and 1956. Our 1956 deficit was 3 per cent.

We can say with conviction that we have a splendid staff and that all departments are overloaded and understaffed. Our present staff is 52 in number, 18 men and 34 girls. Further opportunities for service are almost unlimited; we are limiting ourselves here to the most urgent items.

The continuing effects of inflation seem to require an increase in our budget of about 5 per cent per annum in order to maintain our service.

The following annual figures are as of 1957.

The Advertising Council campaign is responsible for our current deficit. We believe that the value of this campaign to our cause has justified the expenditures and the Board of Directors has supported us in this belief. The anticipated income from royalties has been slow in materializing. To balance our budget we need: $30,000

Our Flammable Liquids and Gases Field Service projects are inadequately financed. We need: $10,000

We have been operating for years without adequate reserves. We should have a minimum of $250,000 (now $89,000). For this we propose to set aside annually: $30,000

Our Fire Record Department, consisting nominally of two men and two girls, is seriously understaffed as one of the men doubles as staff chemist and the other devotes much time to the Society of Fire Protection Engineers. We need here another qualified man, another girl and additional office space. Needed: $25,000

Our aviation activities are very valuable. Unless support is forthcoming, our activities in this field must be curtailed. We need: $10,000

Our Fire Services Department functions with two men and one girl and is grossly inadequate to meet the increasing demands from fire departments. We need another man and another girl here. Needed: $25,000

Our Electrical Field Service Project is operating on a somewhat unsatisfactory basis with the International Association of Electrical Inspectors contributing the overhead and requiring considerable contribution of time by our Electrical Field Engineer. To bring this project into proper operating balance, we need: $10,000

Other special projects presenting the most immediate need for service include the chemical field, the building construction field and the farm field. We estimate that $25,000 would launch each of these projects. Needed: $75,000

This report was approved as a statement of objectives, which should be met as soon as additional funds can be secured. During the discussion Mr. Queener referred to favorable prospects for securing funds from the Chemical Industry, and Mr. Bugbee reported on his approaches to various Foundations, unsuccessful to date but to be continued.

Membership Dues Increase

11. After further discussion of the financial needs of the Association, it was voted to recommend to the Annual Meeting that the dues of Associate Members be increased from $12.50 to $15.00, and that an additional $5.00 be charged associate members outside of the United States, Canada and Mexico to cover postage and increased expenses.

Other Reports

12. Mr. Bugbee reported on NFPA staff investigation of the possibilities of holding commercial exhibits at our annual meetings, and the staff recommendation that at the present time exhibits would not be desirable. This report was approved, without prejudice to the reopening of the subject at a later date.

13. Mr. Cobb, Chairman, reported on the activities of the Industrial Committee.

14. The report of the Technical Advisory Committee, presented by A. L. Brown, Chairman, was approved. The Technical Advisory Committee has considered the various matters referred to it by the Board and has the following recommendations to make at this time.

We recommend that the name of the Committee on Farm Fire Protection be changed to Rural Fire Protection. This is in line with the recommendations of the committee. No change in scope statement is required.

In accordance with the recommendations of the Committee on Laws and Ordinances and the recommendations of the Committee on Flammable Liquids, we recommend that the Committee on Flammable Liquids be authorized to change the form of the Flammable Liquids Ordinance, NFPA No. 30-L, to a Code to be known as NFPA

No. 30. This will broaden the scope of the text, making it available for general use in addition to its present functions as a municipal ordinance.

At the July 16, 1956 meeting of this Board, a request from the National Machine Tool Builders Association for the NFPA to establish a project for developing machine tool electrical standards was considered and referred to the Electrical Correlating Committee for its recommendations. That committee has recommended the formation of a committee on Machine Tool Electrical Standards, comparable with, but separate from, the present National Electrical Code Committee, this new committee to report to the Electrical Correlating Committee.

The Technical Advisory Committee recommends your approval of the formation of a Machine Tool Electrical Standards Committee (as outlined) with Mr. William Biester, Jr., of the National Electrical Contractors Association as its Chairman. The scope statement for this project to be: "Electric motor driven machine tools removing metal in the form of chips, not portable by hand, having two or more motors."

We recommend confirmation of the various committee appointments shown on the list circulated to members of the Board with the agenda. These changes are for the most part of a routine character, but a few of them involving new committee officers merit special mention.

Blower Systems: C. M. Blaesi (Chairman), Federation of Mutual Fire Insurance Cos., replacing W. M. Jones, resigned.

Fire Pumps: Robert Rickner (Secretary), New York Fire Insurance Organization. This committee has not recently had an appointed secretary.

Laws & Ordinances: Warren J. Baker (Chairman), Insurance Company of North America replacing Leon A. Watson.

Farm Fire Protection: Robert C. Byrus (Chairman), University of Maryland, replacing L. G. Keeney who remains a member.

15. Proposed committee appointments were confirmed in accordance with the list submitted with the Board agenda.

16. Mr. Bugbee reported on a successful fire prevention session conducted by the American Standards Association, in which the program had been arranged by the NFPA, emphasizing our standardization activities. He also reported upon an ASA project on classification of flammable liquids, which duplicated NFPA activities. We have recommended to ASA dropping the project.

17. Mr. Bond reported on various new organizations in fire prevention work, indicating the problems involved.

18. Mr. Bugbee presented a letter from the American National Red Cross, expressing appreciation to the NFPA for our activities in support of the Red Cross.

19. It was voted to present to the Mayor of the City of New York a special citation for current New York Fire Department activities in fire prevention which have brought about a substantial reduction in the number of fires in 1955 and 1956.

20. Mr. Reske discussed the hazards involved in smoking in hospitals. This was referred to the NFPA staff.

21. The General Manager was instructed, on behalf of the Board, to send a letter of commendation to Anthony J. Mullaney, retired fire commissioner of the City of Chicago.

22. Mr. Bugbee reported that Mr. A. L. Brown, recently retired as Chief Engineer of the Factory Mutual Engineering Division, had joined the NFPA staff in a part-time consulting capacity, for work on the next edition of the NFPA Handbook of Fire Protection.

23. President Neale proposed the idea of an award to members who had rendered signal service to the Association. It was voted to approve such an award and to give the Advisory Committee power to work out the details.

24. A vote of appreciation to Treasurer Freeman for making available the fine facilities for the meeting was unanimously adopted.

Large Loss Fires of 1956 — Summary

An NFPA Staff Study

There were 430 fires in the United States and Canada during 1956 with individual losses of at least $250,000. Of these, 86 involved losses of $1,000,000 or more. Corresponding figures for 1955, the worst "large loss" year prior to 1956, were 316 fires and 61 million-dollar losses. The loss of $330,156,000 in 1956 was the worst on record, the 1953 loss of $274,374,500 being the previous high.

In these large loss fires, there were 401 deaths (includes 333 aircraft fire fatalities), and 1026 injuries (nonfatal aircraft injuries not included).

The 430 large loss fires accounted for about 24 per cent of the total fire loss in the United States and Canada during 1956. Because of this effect of large loss fires on the over-all fire waste total, and also because of the many inevitable indirect losses which cannot be accurately measured in dollars, these 430 largest fires of 1956 have been carefully analyzed. The results have been published in this issue of the QUARTERLY so that the lessons of these fire disasters may be easily recognized by those responsible for the application of sound fire prevention and protection principles.

In order to present the results of this study in a useful form the fires have been grouped into eight classifications (see Table of Contents). A discussion of the significant factors responsible for the fire experience in each classification is presented and, except for the 87 aircraft fires, individual fire reports have been included for all fires with losses of $500,000 or more. At the end of each of the classifications the fires with losses from $250,000 to $500,000 are listed. A list is also presented on pages 318 and 319 of the large loss aircraft fires. Because of the specialized nature of the aircraft fires the reports will be published in an NFPA Aviation Bulletin.

Efforts have been made to obtain accurate information on the 430 fires. We are indebted to city, state and provincial fire officials, insurance organizations and many individual members for the reports that form the basis of this study.

No. of Large Loss Fires by Years

	1956	1955	1954	1953	1952
Manufacturing	117	78	75	105	88
Storage	50	41	54	48	44
Mercantile	53	50	54	29	38
Transportation	92	70	57	39	48
Residential	24	9	11	11	13
Miscellaneous	94	68	62	61	44
Totals	430	316	313	293	275

Geographical Distribution

Three hundred and four of the large loss fires occurred in the United States, 34 in Canada. States with the greatest numbers were California with 26, Illinois and Pennsylvania 25 each, New Jersey 23, New York 22, Ohio 22, Indiana 16. In Canada, the Province of Ontario had 11 large loss fires, Quebec 5. Transportation fires are not included in this geographical summary.

Construction Features

Past studies of fires have shown that large losses usually can be prevented by structurally limiting the area through which a fire may spread. Construction weaknesses have always played a prominent role in the large loss fire experience and the 1956 experience was no exception. Of the 320 fires that occurred in buildings, structural fire protection weaknesses played a significant part in the extent of damage in 260 instances. In these 260 building fires one or more of the substandard fire protection features of the buildings enumerated in the following paragraphs contributed to fire spread.

Division walls are a major structural device for limiting fire spread. The

absence of a division wall (instances where good judgment would have recommended subdivision) was noted in 214 fires.

There were 10 instances of substandard division walls (e.g. did not extend through roof, low fire-resistance rating, etc.), 12 instances of unprotected doorways in division walls, and four of fire doors blocked open.

In the 212 buildings of more than one story (including 29 one-story buildings with basement) fire spread beyond the story of origin in 152 cases because of 87 open stairwells, 39 open elevator shafts, 39 nonfirestopped walls and four openings around pipes.

Other frequently recorded structural features contributing to the extent of fire were combustible fibreboard (7), other combustible interior finish (4), oily floors and walls (7) and combustible insulation (3).

Seventy-nine fires spread from the building of origin to exposed buildings for one or more of the following reasons: 40 cases of combustible buildings without intervening fire walls, outside sprinkler protection or adequate separation of buildings; 19 cases of poorly constructed party walls; seven interconnecting passageways; seven explosions; 11 ordinary glass windows; one yard storage; and one wood shingle roof.

Fire Detection and Alarm

Provision of means for prompt fire detection is a vital part of a program to prevent large loss fires. Last year discovery of the fire was delayed in 244 building fires. In most of these (204) delay occurred because the buildings were not in operation (closed for the night or weekend) and had been left without watchman or automatic fire protection during nonoperating periods. There were, however, 27 instances where substandard watchman protection was responsible for delayed discovery. Only six properties were protected by central-station-supervised automatic fire detection systems. These systems detected the fires and transmitted the alarms (five industrial plants, one store) but because of the combustibility of the contents, origin in concealed ceiling spaces, improper storage methods and lack of sprinklers the fires had spread beyond control by the time fire fighters arrived.

In the 76 instances where fire was discovered without appreciable delay, the tremendous advantage gained by prompt detection so that professional fire fighters could get into action while the fire was small was lost at 46 fires because alarm transmission was delayed. The chief offenders were occupants (16 instances) who chose to try to put out the fire without professional help and only called the fire department after the fire had gotten out of control. Other recurring reasons for delayed alarm were ten instances of burned telephone wires, four cases of bystanders neglecting to transmit the alarm, three in which watchmen fought the fire before transmitting the alarm, three of delayed alarm due to lack of a fire alarm box.

Extinguishers, Standpipes, Brigades

Most large loss fires had grown to "pumper stream" size before discovery and in these instances fire extinguishers and standpipe hoses were not a factor in the outcome. Fire extinguishers were used in 48 cases. Following a grain dust explosion at a grain elevator at Port Arthur, Ont., extinguishers were used to put out small fires that broke out. In the other 47 cases extinguisher performance was not satisfactory for the following reasons: fire too far advanced on discovery 45, wrong type for class of fire 1, inadequate number of units 1.

There were 21 fires where losses would probably have been considerably less had standpipe hoses been available. Employees made effective use of standpipe hoses at 5 fires. At 20 others standpipe hoses were ineffective.

Ten private fire brigades performed their duties satisfactorily, but in ten

cases they could not do so because the fire was too far advanced at time of discovery and in two cases because the brigades were poorly trained. At 26 fires the absence of a well-trained and equipped fire brigade was a notable weakness in private fire protection.

Fire Causes

In 45 per cent of the 320 building fires known or probable causes were reported. This percentage is unusually high (28 per cent in 1955) and may indicate that these large loss fires are being investigated with greater thoroughness. Of the 144 known or probable causes there were 21 incendiary or suspicious fires (five in 1955). Wiring faults accounted for 20 fires, careless smoking 15, lightning 14, careless cutting and welding practices nine, spontaneous heating six, and defective motors five.

Sprinkler Protection

Thirty-eight of the 320 buildings involved in large loss fires in 1956 were provided with a sprinkler system. If the statement is valid that sprinklers will prevent most large loss fires, how can we account for the fact that 12 per cent of the building fires occurred in sprinklered buildings? The explanation is found in a study of the 38 "sprinklered" large loss fires, from which it will be seen that in most cases where sprinkler performance was unsatisfactory the trouble lay in the installation and maintenance of the particular systems in question. In the face of this concentration of unsatisfactory performance one should keep in mind the fact that this study dealt exclusively with large fires and that in a recent study of sprinkler performance,* sprinklers performed satisfactorily in 96.2 per cent of the 58,971 fires studied.

Thirty buildings were completely sprinklered. In one case the system was not a factor (industrial plant) and in five others sprinklers performed satisfactorily (all industrial plants).

At nine fires involving completely sprinklered buildings sprinkler performance was not satisfactory because the hazards of occupancy were too severe for the systems as installed (eight industrial plants, one pier). In four instances water was shut off (two in industrial plants, one in a warehouse, one in a pier). Three sprinkler systems were damaged by explosions (all industrial plants). In three fires improper storage methods permitted the fires to overpower the sprinkler systems (all warehouses). Two exposure fires overpowered sprinklers (one in an industrial plant, one warehouse). In one case (a warehouse) the sprinkler valve was closed before the fire was out. Lightning was the cause of damage in another (industrial plant) and poor water supplies were responsible for one case (dormitory).

Sprinkler performance was not a factor at four of the eight fires involving partial sprinkler systems. These four fires originated outside of and did not spread into sprinklered areas (one apartment, one orphanage, one school, one industrial plant). Three partial systems performed satisfactorily (one industrial plant, one warehouse, one theatre). Unsatisfactory performance of a partial system occurred in a warehouse because fire originating in an unsprinklered area reached such intensity before entering the sprinklered area that sprinklers were overpowered.

*Automatic Sprinkler Tables — 1955 (Q48-12); Published by the National Fire Protection Association. Price 25 cents.

Editor's Note: An asterisk (*) before a listing of a fire indicates that the fire spread to other buildings. A dagger (†) after a loss figure indicates that the figure includes an insured business interruption loss. The Index appearing in this issue of the QUARTERLY will aid the reader in locating examples of important contributing factors to the large loss fires.

117 Large Loss Industrial Fires in 1956

The 117 large loss industrial fires in 1956 represent a 50 per cent increase over the 78 fires in the United States and Canada in 1955. The 1956 record is worse than that of any other previous year and is the principal reason for the approximately 10 per cent increase in the over-all fire losses in these two countries in 1956. These 117 fires caused a total loss of $69,635,000, and were responsible for 37 fatalities (19 fire fighters, 18 others) and 197 injuries (129 fire fighters, 68 others). In the following paragraphs only the outstanding factors responsible for this disgraceful and tragic record can be enumerated. For a more complete analysis, the individual fire summaries presented should be studied.

When the Fires Occurred

The 1956 large loss industrial fire experience differs from that of past years in several respects. In past years, for example, more than half of the fires have occurred while the plants were operating (52 per cent in 1955) whereas in 1956 only 41 per cent occurred during operating periods when employees were present to discover fires before they spread out of control. This reversal of past experience was reflected in a greater percentage of delayed discovery fires in 1956 (53 per cent) than in 1955 when 47 per cent made considerable headway before discovery. In 47 of the 62 delayed discovery fires, the delay could be explained by the absence of automatic protection or a watchman. Substandard watchman protection was responsible for delayed discovery in eleven instances, miscellaneous reasons being responsible for the other four.

There was no appreciable delay in discovery in 55 instances but in these cases large losses resulted for one of several reasons: explosions preceding or immediately following the outbreak of fire, rapid flamespread characteristics of the contents, absence of automatic fire protection or a well-trained fire brigade, and delay in fire department notification.

Automatic Fire Alarm Systems

Automatic fire detection equipment gave the first notification of 5 of the 117 fires and from reports of investigations of the operation of these five systems it must be assumed that they performed satisfactorily since they apparently did what they were designed to do, namely, detect the fire promptly and transmit the alarm. Nevertheless, because of the rapid spread of fire due to the absence of some means for prompt control, either manual or automatic, the fires reached large loss proportions. These fires occurred in an asphalt compounding plant at Cleveland, Ohio, a feed mill at Bellflower, Calif., a paper working plant at Denver, Col., a paper working plant at Baltimore, Md., and a woodworking plant at Philadelphia, Pa.

Fire Department Alarms Delayed

Another reason that fires which were discovered without appreciable delay eventually became large losses was delay in fire department notification. Eight of the fires that were discovered while the fires were still small spread out of control because employees delayed calling the fire department until after they had made unsuccessful attempts to extinguish the fires with first aid equipment.

Building Features

One hundred and thirteen of the large loss industrial fires occurred in buildings. The principal building types involved were the following: brick, wood-joisted (38), wood (29), noncombustible (16), wood-framed, metal-clad (11), and fire-resistive (3). As in other years weaknesses in the fire-safe design of many of the buildings made it

possible for a large proportion of the fires to spread from the area of origin. Under the category of building design weaknesses the following appeared most frequently as factors in the 1956 record: lack of fire divisions to subdivide excessive areas (72), stairwell not enclosed (22), elevator shafts open (10), stairwell enclosure substandard (6), large undivided attic (5) and no protection for fire division openings(4).

Highly Combustible Contents

In practically all of the 117 building fires the contents of the building contributed fuel for the fire but in 84 cases the combustible or explosive properties of the contents were outstanding reasons for the extensive damage. Flammable liquids, for example, helped spread the fires in 35 cases, combustible dusts in 14, and flammable gases in 12. Poor housekeeping practices (rubbish accumulation, dust accumulation) were notable factors in 10 fires and substandard storage practices (inadequate subdivision, high piles, etc.) in 7.

The Record of Sprinklers

The backbone of industrial fire protection is a sprinkler system, designed so as to be able to cope with the particular hazards in the area to be protected and a system that is maintained in good operating condition. For this reason a review of the sprinkler experience in the 23 large loss industrial fires in sprinklered plants should be valuable as an aid in understanding why these fires became "large losses."

Four of the fires did not occur in buildings. Of the 113 building fires, sprinkler protection was installed in only 23 cases. At the other 90 plants, the management hoped that someone would be on hand when the fire broke out to extinguish it with extinguishers and other first aid equipment or that the public fire department would be called soon enough to be able to bring the fire under control quickly. The record shows that they were not basing hope on sound fire protection principles.

There were 21 complete sprinkler systems and two partial systems. This experience is an improvement of that of 1955 when 27 complete systems and three partial systems were involved. Of the 21 complete systems 5 performed satisfactorily (auto assembly plant, Los Angeles, Calif.; textile plant, Philadelphia, Pa.; feed mill, Amarillo, Texas; metalworker, Lincoln, N. J., and hosiery mill, Madison, N. C.). In these fires the large losses were due to water damage or explosions. There were 15 fires in which sprinkler performance was not satisfactory. As was the case in 1955, hazard too severe for the system as installed was the most frequent cause of unsatisfactory performance. There were eight such large loss fires in 1956 (sawmill and woodworking plant at Marquette, Mich.; metalworker, Muncie, Ind.; furniture factory, Winston-Salem, N. C.; furniture factory, Keene, N. H.; wood flooring mill, Shreveport, La.; sawmill, Wright City, Okla.; wood siding mill, Everett, Wash.; furniture factory, Lock Haven, Pa.). Three sprinkler systems were damaged by explosions: plastics manufacturing, Schenectady, N. Y.; plastics manufacturing, Fitchburg, Mass.; aluminum extruder, Newnan, Ga. In these cases damaged piping prevented effective sprinkler discharges in the areas effected.

Fire caused excessive damage to the roof of an asphalt impregnating plant at Perth Amboy, N. J. because the sprinkler control valve had been closed and not reopened following an earlier fire. The water tank had been drained and was undergoing repairs when fire broke out at a textile dye works at West Sand Lake, N. Y. Movement of a building when struck by lightning broke a 4-in. sprinkler feed main at the furniture factory, Paris, Ont., and an exposure fire entered a woodworking plant at Philadelphia, Pa. and overpowered the sprinkler system due to weak water supplies.

At an instant coffee plant in Jamaica, N. Y. fire was confined to the inside of a drier and connecting equipment and did not involve sprinklers.

One of the two partial sprinkler systems involved in large loss industrial fires in 1956 was at a leather goods factory at Pine Grove, Pa. Since the fire did not involve the spray booths which were the only parts of the building protected, the system was not a factor in the fire. At a multiple occupancy manufacturing building at Seattle, Wash. the only part of the building sprinklered was the basement. Fire that originated in trash barrels in the rear loading platform entered second story windows and spread throughout the four story building but was held in check in the basement by sprinklers.

What Causes These Fires

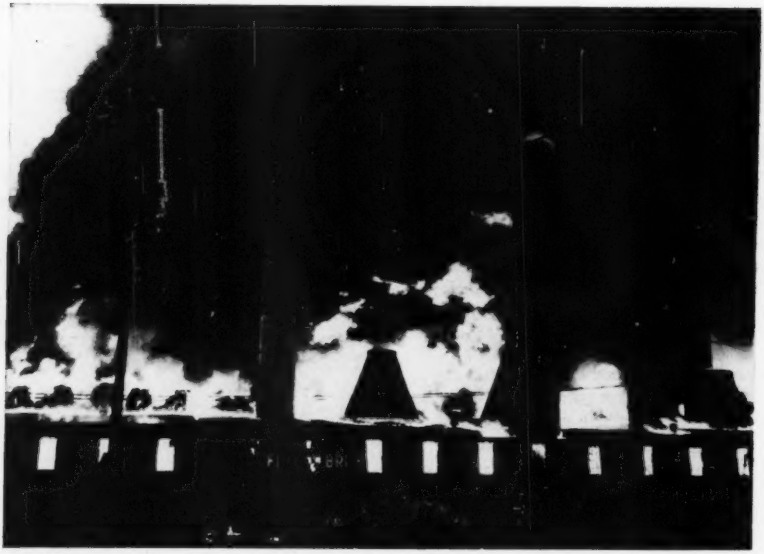
In 54 fires the cause could not be determined due to the destruction of evidence or the lack of trained investigators. In 63 cases, however, it was possible to arrive at a definite or probable cause. This number is exceptionally high considering the percentage of fires that were beyond control when discovered and it is hoped that it reflects an increased recognition of the importance of determining the actual cause of fires. There were 43 different causes, only six of which appeared more than once. Careless welding and cutting caused six fires, lightning, six. Five fires were set or of suspicious origin, four were due to spontaneous heating of specific known substances; three were traced to defective wiring and two to overheated or defective motors.

Brick and Tile Works

June 9, Uhrichsville, Ohio, Clay City Pipe Co. $500,000†

Sewer pipe, flue liners, other clay products. The 1- and 3-story masonry, wood-joisted building destroyed by the fire consisted of large open areas (ground floor area 35,714 sq. ft.), slatted wooden floors and a

†Figure includes business interruption loss.



Wide World

This fire brick plant at Woodbridge, N. J. was comprised of several adjoining buildings which, because there were no fire walls with protected openings between buildings, comprised a single fire area of 305,000 sq. ft. **(See report page 263.)**

wood roof. There was no automatic fire protection and the only watchman protection was provided by the kiln fireman who made unsupervised rounds. The fire originated in the third story where it was discovered by the kiln fireman at 6:10 P.M. The local fire department responded and took suction from an abandoned clay mine 150 ft. away but was unable to check the spread of fire due to the slatted floors and lack of fire divisions and because of the threat of collapse of upper floors where a heavy concentration of greenware was drying.

Oct. 17, Woodbridge, N. J., Valentine Fire Brick Co. $1,000,000†

Fire brick. The large group of 1- and 2-story, mostly wood-framed, asbestos- or aluminum-clad buildings that comprised the plant communicated with each other and formed a single fire area of approximately 305,000 sq. ft. In the center of the group were five periodic kilns, three of which passed through the combustible second floor and roof with fair clearance.

The fire was discovered in the second story in the vicinity of one of the kilns less than an hour after the kiln operator had banked coal fires and left. An effort was made by the watchman to telephone the alarm from two different telephones at the plant, but both telephones had already been put out of operation by the fire. The alarm was finally transmitted by a neighbor. In the meantime the fire had spread rapidly through the second story of the building of origin and into the communicating building. Although hampered by an inadequate water supply from street mains, fire fighters managed to save about half of the plant.

It is thought probable that a crack developed in the kiln due to overheating through which flames escaped and ignited the second story flooring.

Chemical Plants

April 19, Marcus Hook, Pa., Sun Oil Co. $3,000,000

Ammonia synthesis. An explosion in a nitrogen oxygen separating unit in a steel enclosure destroyed the unit and an adjacent hydrogen purification unit and blew in a 1-story masonry control house. Eight employees were injured but none were killed, probably due to the fact that the explosion occurred during a change of shifts, before the new shift had taken up its position.

†Figure includes business interruption loss.

United Press

Special fire extinguishing equipment was not installed at the mixing machines at this asphalt products chemical plant at Cleveland, Ohio on March 20 and the mixing room was not cut off from the rest of the plant.

Cause of the explosion has not been released and probably is not known. Fire that broke out at the equipment immediately following explosion involved ethylene, the refrigerant for the separation unit. The plant fire brigade set up five deluge nozzles to cool the equipment and surrounding area until the fire consumed all the ethylene and went out.

May 22, Kitimat, B. C., Aluminum Company of Canada, Ltd. $500,000; 1 killed

Carbon plant. When a pitch weigh tank on the third story mezzanine overflowed, the operator tried to close the valve but could not with the result that the contents of three pitch storage tanks overflowed the weigh tank, flowed out over the mezzanine floor, down to the third floor and through numerous floor openings to the second floor where it ignited. The ignition source is unknown. An employee lost his life when fire flashed up through the building.

Nov. 11, near Paducah, Ky., United States Atomic Energy Commission. $2,100,000

Gas processing building at plant for separation of U-235 by gaseous diffusion process. The roof of this unsprinklered and undivided 70,000 sq. ft. 2-story building was destroyed and much of the structural steel in the second story was damaged by fire that originated at a process gas compressor at one end of the second story. The fire may have originated when a seal on the compressor failed and allowed gas (identified only as noncombustible but reactive) to escape and impinge on oil in an adjacent drip pan. Fire is then presumed to have ruptured a flexible tube carrying lube oil (flash point 330°F.) under pressure.

When discovered by an employee a 10-ft.-diameter area in the vicinity of the compressor was in flames and fire was extending 25 feet in the air. The alarm was sent at once and employees attacked the fire with portable equipment but the fire quickly spread to the 36-ft.-high roof (metal deck, tar vapor barrier, glass fibre insulation, tar and gravel). Interior hose streams were in operation nine minutes after discovery but by then flames were spreading rapidly beneath and above the roof against an 11 mph wind, burning tar was dropping and structural steel was starting to collapse. Fire fighters were very shortly forced outside by the heat and smoke. Flames spread unchecked along the roof and within 45 minutes of the start of the fire the entire roof was ablaze and large areas were collapsing. Two hours and 36 minutes after the start the fire was sufficiently under control to allow firemen to go inside again.

Investigators believe that the discharge of 4 to 5 gpm of lube oil from the ruptured tubing, although necessary for the original ignition of the roof, was not thereafter an important factor and that the tar vapor seal contributed the fuel for the rapid spreading roof fire.

Electric Generating Plant

July 18, Graham Station, W. Va., Central Operating Co. $500,000

Steam-powered electric generating station. An explosion of coal gas that had collected in a conveyor gallery above a bank of crushed bituminous coal storage bins injured three employees and caused about 300 sq. ft. of the brick panel wall of the 70-ft.-high building to collapse.

Evidence of spontaneous heating had been noted during the week preceding the explosion and arrangements had been made to dig out the hot areas in the bins starting at 11:00 P.M., July 18. At 6:30 P.M., however, smoke was seen coming from the gallery. A slight explosion occurred at 6:50 P.M. when an employee opened a door to the gallery to investigate, and at 7:10 P.M. while three employees were directing hose streams into the bin a severe explosion occurred.

Since the maximum time that coal normally remained in the bin was 30 hours, it is believed that the spontaneous heating must have involved damp coal that had collected on the sides.

Fertilizer Plant

July 28, near Pensacola, Fla., Merchants Fertilizer and Phosphate Co. of Pensacola, Inc. $542,500

Dry mixing fertilizer plant. The plant destroyed by the fire was an undivided combustible building of 50,000 sq. ft. floor area located outside the city limits where public fire protection was not provided and yet had no private protection. During a thunderstorm lightning either struck the roof or entered the building over electric wires. Flames were coming from that part of the building housing the electric panel board when discovered by an outsider at 5:00 A.M. and had spread through most of the building when fire departments started arriving about 15 minutes later. Water from a nearby plant system was used to protect exposures.

The destroyed building had replaced a similar building destroyed in a $322,500 fire in 1954. (See January 1955 QUARTERLY page 206.) Except for the cause, the circumstances of the two fires were identical.

Food and Food Products

Animal Feeds

Nov. 24, Dallas, Texas, Southland Cotton Oil Co. $635,000; 3 killed

Three of the 18-man crew at work at the mill were killed and all others except the watchman were hospitalized by a dust explosion that occurred while a carload of cottonseed meal was being unloaded.

Ken Hardin

Although the sprinkler piping in the upper part of the elevator at this Amarillo, Texas feed mill was broken by a dust explosion the fire department pumped into the sprinkler system. This procedure permitted sprinklers to help protect the rest of the feed mill and an adjoining warehouse. This fire occurred on November 20, 1956.

The first of the two explosions occurred in the first story of the 4-story wood-framed metalclad feed mill building and was followed within seconds by a much more violent explosion. This mill building was in the approximate center of a group of adjoining and communicating buildings covering an area 50 ft. wide by 300 ft. long. Except for high fire-resistive grain bins communicating with the feed mill most buildings were 1-story in height and of brick, wood-joisted construction.

The explosion traveled up through the 143-ft.-high grain elevator but damage here was confined primarily to machinery. The explosion knocked down several 12-in.-thick division walls between the 1-story buildings and blew out fire doors in the walls and was followed by fire that practically destroyed everything in the group except the fire-resistive grain elevator and fire-resistive grain bins. Using 20 2½-in. hose lines, most of which had to be run long distances, firemen secured control in 1½ hours.

At the time of the explosion dust conditions in the feed mill were very bad. Possible ignition sources included any one of several pieces of electrical equipment not approved for dusty locations.

Beverages

May 18, Montreal, Que., Molson's Brewery Ltd. $1,250,000; 1 killed

Beer fermenting and storage. One man was fatally injured and the fourth, fifth and sixth stories of the 7-story fire-resistive building were damaged extensively by an explosion of ammonia vapors. Investigators concluded that a cast iron strainer in the suction piping on a direct-type ammonia refrigeration unit in the fifth story had been the source of the leak. It is believed that retightening of bolts after cleaning the strainer a few hours prior to the explosion had set up stresses that eventually caused the strainer to break. Possible ignition sources included an ordinary light bulb at the ceiling or static discharge generated by the rapid escape of ammonia or by a V-belt driving cooler fans. Ten tons of ammonia escaped from piping broken by the explosion but no fire ensued.

Principal damage occurred in the fifth story where parts of brick walls were blown out, the ceiling slab in one area was raised, part of the floor was collapsed and partitions were badly damaged. Because of the necessity of maintaining controlled low temperatures no explosion venting was provided.

Canneries

April 29, Portland, Ore., Northwest Packing Co. $1,286,500†

Dog food, green beans, strawberries. Fire that destroyed this 20,000 sq. ft. 1- and 2-story wooden building originated on the second floor in a large mixing kettle in which a mixture consisting principally of soybean meal, fish meal and bone meal had stood for three days. Spontaneous ignition was the probable cause. One factor that may have accelerated the heating was the fact that the top of the open kettle was four feet beneath the 1-in. thick wood roof on which the sun had been shining for several days. Investigators reached this conclusion from the fact that the meal in the kettle was found to be completely charred and because the fire when first discovered by an outsider was burning in the roof directly above the kettle.

The plant was not sprinklered and was left without watchman or automatic fire detection protection during the weekend.

†Figure includes business interruption loss.

Lawrence Barber

Spontaneous heating of a mixture of soybean, fish and bone meals was the probable cause of fire that broke out in this Portland, Ore. dog food cannery during the weekend on April 29. There was no private fire protection. (See report, this page.)

James S. Rayner

The nearest hydrant to this fruit packing plant near Yakima, Wash. was 1,800 ft. away. On May 15, 1956 fire fighters found this a serious handicap.

Leather Working

*May 19, Pine Grove, Pa., Garden State Tannery, Inc. $1,000,000

Upholstery, bag and suitcase leather. A group of 1-, 2-, and 3-story buildings of mixed construction all communicating through unprotected openings and thereby in effect comprising a single building with 150,000 sq. ft. ground area was destroyed by fire. Particularly sad was the fact that 340 people were thrown out of work by this fire.

To anyone at all acquainted with fire hazards it would have been evident that the conditions at this plant were such that a fire was probable and once started would likely spread throughout the entire group of buildings. Hazardous areas were not cut off, there were no division walls, the only sprinkler protection was in spray booths, lacquer deposits were prevalent in spraying areas, exhaust systems were not of sufficient capacity to remove dust from buffing areas, and recommended practices for storage and handling lacquers and other flammable liquids were violated. Several hundred 55-gallon drums of flammable liquids were stored throughout the group of buildings, and in fact the lacquer mixing area was said to resemble a lacquer factory rather than a tannery.

The fire originated in the middle of the plant in a buffing area shortly after the night shift went home and the plant closed for the weekend. Discovery was reasonably prompt by a foreman and the watchman but because of the dusty conditions spread of fire was rapid. Local firemen at first thought the fire could be confined to the section of origin but flames spread through unprotected openings to an adjoining section and on reaching the lacquer mixing department in the second story became so intense that firemen lost any chances they may have had of checking the spread before destruction was total.

*Fire spread to other buildings.

Metalworking

Aircraft Maintenance Shop

Feb. 23, Andrews Air Force Base, Md., United States Government. $860,000

Fabrication and maintenance shop. Absence of automatic protection and watchman service allowed fire to involve 70 per cent of the 20,000 sq. ft. 1-story wooden building before discovery by a passerby at 5:18 P.M. Other important factors responsible for the total loss were absence of division walls, release of flammable liquids and gases from containers during the fire and the use of a combustible "low density finish" on interior walls and partitions.

Aluminum Fabricating

July 16, New York (Bronx), N. Y., Benada Aluminum Products. $900,000†

Aluminum storm windows and doors. At 4:30 P.M., an hour after most of the employees had gone home, one of the employees still on the premises discovered a fire in a remote area of the unsprinklered 14,700 sq. ft. 1-story masonry, wood-joisted building. The fire by then was too big to be controlled by extinguishers and by the time apparatus arrived had spread so far that the building could not be entered. A cinder block partition that divided the building was of no value as a fire barrier.

It is regrettable that further details that might explain the cause and rapid spread have not been released.

†Figure includes business interruption loss.

La Vale Volunteer Fire Department, Inc

Because of substandard watchman protection, fire at this glass works at La Vale, Md. on Sept. 26 made considerable headway in the unsprinklered and undivided building.

Norman Studio

Three employees were killed and 12 were injured when an explosion demolished this aluminum extrusion plant at Newnan, Ga. The explosion occurred when a bin of scrap aluminum that also contained water was dumped into a melting pot containing molten aluminum. This Dec. 27, 1956 fire caused $250,000 damage.

United Press

On January 27, 1956 heavy rainfall water flooded the yard of this auto assembly plant at Long Beach, Calif. On entering the basement of a flammable liquids storage building the water floated eight unanchored storage tanks and broke tank connections. Escaping flammable liquids floated on the water to a water pump where they ignited.

Electrical Appliances, Equipment

March 3, Columbus, Ind., Columbus Process Co., Inc. $575,000

Radio and television parts. During the weekend while this plant was shut down and left without automatic or watchman protection fire broke out. It was not discovered at once and in fact had made so much headway when firemen arrived that they were unable to enter the undivided 28,000 sq. ft. 1-story masonry, wood-joisted building.

Investigators believe the fire originated in the rear of the building in the vicinity of one of eight gas-fired unit heaters. These heaters were vented with ordinary metal vent pipes that passed through the combustible fibreboard ceiling and roof with inadequate clearance. Another possible cause was an electric soldering iron. Soldering irons had frequently been left on by mistake in the past.

The combustible fibreboard ceiling, vats of varnish, wax and acetone, and gas escaping from a ruptured service main inside the building all contributed to a rapid-spreading and intense fire. Since the shut-off valve for the gas service main was inside the building there was considerable delay before the gas could be shut off.

April 1, near Garland, Texas, Varo Manufacturing Co., Inc. $1,003,000

Electronic devices. On his 6:00 P.M. Sunday round, one of the two watchmen at this undivided and unsprinklered 31,400 sq. ft. 1-story building discovered fire in a cardboard trash box. He extinguished the fire in the box with an extinguisher only to discover that flames were spreading up the adjacent combustible fibreboard partition to the combustible fibreboard suspended ceiling. The second watchman tried to telephone the fire department but found the telephone out of order. He went in his car to find another telephone but in the meantime two boys had seen smoke coming from the building and had reported the fire.

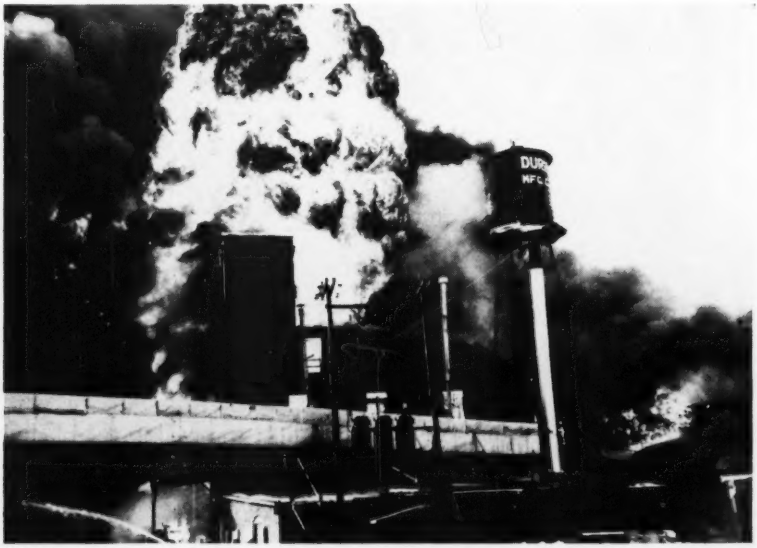
First responding firemen found flames coming from the roof and immediately sent for all available assistance. Eleven pumpers eventually responded but of them only four could be used because of limited water supplies, the nearest hydrant being 500 ft. from the building. By 8:00 P.M. the building and its contents were totally destroyed.

Reconstruction was started within a month. Plans included several fire safety measures not in the destroyed building but did not include automatic sprinklers and a private water supply, two vital necessities for a plant located outside the city limits where public fire protection is weak.

Foundries

April 5, Cleveland, Ohio, Eberhard Co. $500,000

Iron casting and annealing. Breakdown of the motor operating the blower of an annealing oven allowed the oven to overheat and ignite oil-soaked sawdust around the bottom of the oven. The fire was discovered by an employee at 5:35 A.M. as he entered



Bill Jamieson

The metal furniture factory destroyed by this fire at Muncie, Ind. was protected by dry pipe sprinkler systems. This protection was overpowered when fire that was caused by a flammable liquid spill flashed through the undivided building on Feb. 23 (see page 271).

St. Paul Dispatch

This railroad car repair shop at St. Paul, Minn. contained two undivided and unsprinklered 40,000 sq. ft. floors, interconnected by unprotected openings and containing a heavy concentration of upholstering materials and flammable liquids. A cutting torch was the probable cause of this $325,000 fire on June 12, 1956.

the building and could probably have been controlled before causing appreciable damage had the fire department been summoned at once. Instead, the employee called his boss at home to ask him what to do. The latter told him to notify the plant guard who did not give the alarm until investigation revealed that the fire had reached the ceiling and was spreading through the oily, undivided and unsprinklered 30,000 sq. ft. 1-story brick, wood-joisted building.

Furniture

Feb. 3, Muncie, Ind., Durham Mfg. Corp. $2,250,000†

Metal tables, chairs. The row of unsprinklered 2-story brick, wood-joisted buildings destroyed by fire at this metal table and chair factory comprised a single fire area 550 ft. long, 50 ft. wide and 2 stories high (3 stories including the basement). Doorways between buildings were unprotected and there were numerous open stairways and unprotected conveyor openings.

The fire broke out in the middle section during the lunch hour. Prior to the lunch period an employee had been removing paint from one of the large dip tanks on the second floor by means of an electrically operated 200-gal. portable paint-transfer tank. He neglected to shut off the pump before going to lunch, permitting the paint to overflow the portable tank, seep through floor cracks and down an uncurbed open stairway to the basement where ignition occurred at a gas-fired unit heater suspended from the ceiling. Fire flashed up through the vapor-filled stairway to numerous dip tanks (total capacity, 14,000 gallons) in the second story. The dip tanks were without covers or canopies but were protected by automatic local application carbon dioxide systems. This protection was not extended to drainboards.

The fire flashed so rapidly through the second story that the carbon dioxide protection was ineffective and had involved such a large area by the time water flowed from sprinklers on the dry pipe system that more sprinklers had fused than the system was designed to supply simultaneously. First arriving firemen found the entire second story in flames. No attempt was made to pump into the sprinkler system through the fire department connection and all available hose streams were used successfully to save two large noncombustible exposures.

†Figure includes business interruption loss.

Machinery Reconditioning

April 28, Grantham, Pa., Aircraft Engine and Parts Corp. $3,000,000

Cleaning and reconditioning aircraft engine parts. Fire that destroyed this 36,000 sq. ft. 2-story masonry, wood-joisted build-

ing originated in the 1,200 sq. ft. cleaning room on the first floor where a so-called safety solvent (flash point about 115°F.) was used. On the day before the fire an automatic switch on one of the cleaning machines had arced. The trouble was temporarily repaired and a new switch ordered which had not been received on the following day when the machine with the faulty switch suddenly became enveloped in flames.

It was the opinion of investigators that ignition of solvent vapors by arcing of the defective switch accounted for the initial fire. Factors responsible for spread of fire throughout the building were absence of sprinkler protection and failure to cut off the cleaning room from the rest of the plant.

Stamping

Oct. 14, Spencerville, Ohio, Nameplate and Monogram Co. $1,145,000†

Metal stamping; tools and dies for stamping. Fire that practically destroyed this 29,000 sq. ft. 1-story building of mixed construction is more evidence that disastrous fires can occur in buildings of combustible construction even if the contents are for the most part noncombustible. Two necessary fire protection features for such buildings, division walls and sprinklers, were absent.

The fire originated in the buffing department and may possibly have been caused by spontaneous ignition of buffing dust. On discovery of the fire at 3:10 P.M. (Sunday) the plant maintenance man tried to control it with an extinguisher before calling the fire department. Fire was beyond control of the local fire department on its arrival and soon thereafter broke through the wood roof. Four hours later the wood roofed section had been totally destroyed and the steel-decked roof of the communicating noncombustible section had been severely damaged.

†Figure includes business interruption loss.

Steel Fabrication

Jan. 7, Baltimore, Md., Miller Metal Products, Inc. $549,500

Metal kitchen cabinets. During Saturday morning, maintenance employees had been cleaning the conveyor system hooks by dipping them in a gas-fired 200-gal. vat of boiling caustic solution. The vat was about six inches above the floor and six inches from a plywood partition. This same cleaning procedure had been followed for years without any trouble. At 1:00 P.M the cleaning work was completed and the flame beneath the vat was lowered. At 1:40 the plant superintendent saw fire climbing up the plywood partition.

Discharge of a 50-pound carbon dioxide extinguisher appeared to control the blaze, but as soon as the extinguisher was emptied the fire broke out again. Before another extinguisher could be obtained fire had extended to a combustible storage deck overhead and was spreading over paint residue that had accumulated on steel beams

Wide World

Fire that destroyed this engine reconditioning plant at Grantham, Pa. broke out when a faulty switch on a cleaning machine ignited vapors from a 115°F. flash point solvent. The cleaning room was not cut off from the rest of the building and the building was not sprinklered. (See story starting on page 271.)

and the under surface of the wood roof of the unsprinklered 23,000 sq. ft. building. In the meantime the fire department had been called. Using 14 2½-inch hose-streams firemen, assisted by a favorable wind, saved half the building.

March 12, near Mitchell, Ind., Carpenter Body Works, Inc. $807,000

School bus bodies. Location of this plant outside the town limits where water supplies for fire fighting were limited, made it vulnerable to destruction by fire even if the fire was small when discovered, as in this case. Consequently it was vital that strong private fire protection in the form of automatic sprinklers be provided. Failure to provide the protection resulted in destruction of this 80,000 sq. ft. 1-story building.

At 4:10 A.M. the watchman while on one of his supervised tours saw flames envelop an electric motor on a suspended steam heated unit heater. He telephoned the alarm at once but it was 20 minutes before the volunteer firemen from Mitchell arrived, by which time the interior of one end of the building was in flames and fire was coming from the roof. Pumpers were hooked up to the only town hydrant at a plant which was supplied by a long deadend 4-in. main. Although it was not possible to enter the building, firemen did think for a while that they could keep the fire in the end of the building where it started. They lost all hope of saving the undivided building, however, when a 6-in. gas service main in the fire area ruptured and a tongue of flame "traveled through the building." Fire then spread through the 80,000 sq. ft. area intensified by exploding drums of undercoat.

At one stage of the fire it was decided to shut off the 220 volt power line to the factory. When this was done power to the town's water booster pumps was also lost and firemen were without water for about 10 minutes until the power was restored.

This interruption probably had no effect on the outcome in the building of origin but might have resulted in destruction of two adjoining exposures which were then the chief concern of firemen, had it not been that both exposures were separated from the building of origin by masonry walls with openings protected by fire doors.

Charles Meehan

Delayed discovery and lack of water were primarily responsible for the destruction of this coal breaker at Plains, Pa. on Feb. 6, 1956.

Titanium Casting

March 6, Niles, Ohio, Mallory-Sharon Titanium Corp. $1,275,000†

Titanium melting by consumable electrode process. Two explosions in the melting furnace extensively damaged the furnace. However, a barricade around the furnace vented to outdoors confined damage in the noncombustible building to a few broken windows. The explosion probably occurred when an electrode came loose in the crucible causing an arc that melted a hole in the bottom of the water-jacketed crucible. This would bring water in contact with molten titanium with the formation of hydrogen gas.

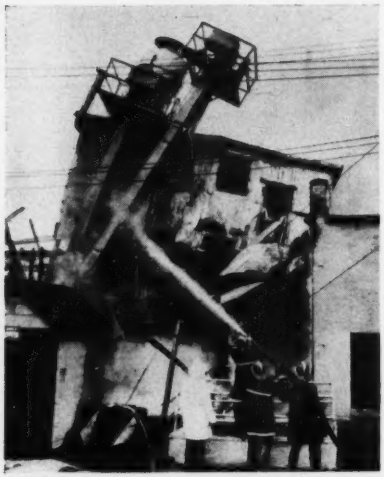
Interruption of production accounted for most of the loss.

Zinc Refining

Nov. 20, near Premier, B. C., Silbak Premier Mines Ltd. $742,500

Zinc refining. Before pouring molten zinc around the mandril to build it up, the "bell" was heated with an oil-fueled preheating torch supplied from a pressurized fuel tank. The fuel line to the torch broke, oil spurted over the surfaces of the room and ignited. Employees attempted to run hoses but were forced from the building.

†Figure includes business interruption loss.



Wide World

Originating in a pile of knocked down cartons, fire at this roofing paper plant at South Bend, Ind. on May 31 spread out of control after igniting residues that had accumulated on the ceiling from the asphalt impregnating process. The plant was not sprinklered.]

Multiple Occupancy Manufacturing

Oct. 30, Seattle, Wash., Oceanic Building. $747,500

Multiple tenant light manufacturing. A 20-year-old man confessed setting fire to rubbish in three trash barrels left on a rear loading platform. Fire entered the second story via a plain glass window in the rear wall and had spread to all stories of the 12,000 sq. ft. 4-story masonry, wood-joisted building when firemen answered a neighbor's alarm at 8:46 P.M. Five sprinklers in the basement, the only part of the building so protected, held the fire in check.

Plastics Fabricating

Feb. 17, Milwaukee, Wis., Pereles Brothers, Inc., et al. $635,000†

Thermoplastic molding. Fire that practically destroyed this 6,200 sq. ft. 1- and 2-story brick, wood-joisted building originated in a paint spray booth where an employee was using a nonexplosionproof electric mixer to mix a jar of paint and thinner. Sparks from the motor ignited thinner vapors and flames quickly enveloped the booth.

The alarm was telephoned at once but the fire spread so rapidly through the undivided and unsprinklered building containing large quantities of paints, thinners and combustible plastic products, that first arriving firemen could not enter the building. Second third, fourth and fifth alarms were immediately struck as it was apparent that exposed buildings were in serious danger. Of the 15 pumpers, five ladder trucks and special equipment that responded, three pumpers and one ladder truck patrolled the neighborhood. The sides and roofs of three dwellings and two garages within 60 ft. of the fire were scorched.

†Figure includes business interruption loss.

Nov. 22, Monterey, Calif., National Automotive Fibre Co. $1,165,000

Plastic-covered automobile arm rests and side door panels. Forty minutes after the watchman had completed his hourly round of the plant, including a trip to the 7,000 sq. ft. mezzanine, a passing motorist saw smoke coming from the building and notified the watchman.

While the motorist ran to a fire alarm box to give the alarm the watchman attempted to remove a standpipe hose from its rack. The hose rack was quite high, however, and he was unable to get the last couple of folds loose and finally gave up any thought of fighting the fire. Firemen arrived about this time and attempted to enter the mezzanine where the fire was centered but almost immediately had to flee as the fire started to spread through the heavily congested undivided and unsprinklered 75,600 sq. ft. 1-story wooden building. Cause of the fire was not determined.

Plastics Manufacturing

March 21, Schenectady, N. Y., General Electric Co. $4,000,000; 2 killed

Synthetic resin and paint. Two men were killed and more than $3,000,000 property damage was caused by an explosion and fire in this 4-story reinforced concrete alkyd resin manufacturing building.

The explosion involved naphtha vapors that escaped into the first story from a hopper on a mixing tank containing about 900 gallons of naphtha. The naptha vapor-

Wide World

Responding to an alarm transmitted by a central-station-supervised automatic fire alarm on Oct. 2, 1956, Baltimore, Md. firemen found a fire at ceiling height in the first story which was occupied by a paper box factory. Firemen had extinguished this first floor fire and were picking up their equipment when it was discovered that fire had entered the second and third stories.

Schenectady Gazette

Explosion of vapors from naphtha that escaped from a mixing tank killed two employees and caused more than $4,000,000 property damage at this Schenectady, N. Y. plastics manufacturing plant on March 21, 1956 (see story, page 274).

ized and escaped when hot resin was discharged into the mixing tank from a reaction kettle in the second story. Apparently the agitator in the mixing tank was not operating and water was not flowing through cooling coils.

The explosion cracked the concrete slab second story floor and broke sprinkler piping suspended from the slabs. Loss of water from broken sprinkler piping allowed fire to spread through cracks and openings around pipes and chutes to upper stories of that half of the building protected by the damaged sprinkler system. An undamaged sprinkler system prevented extensive damage in the other half of the building.

Recommendations to minimize the possibility of a recurrence include use of devices to indicate proper operation of critical components and interlocks to assure correct operating sequence.

Aug. 19, Fitchburg, Mass., Grect American Plastics Co. $685,000

Polyvinyl chloride molding powder. Seeing flammable vapors (probably vinyl chloride) escaping from processing equipment employees closed valves on flammable liquid piping and then fled from the high 1-story noncombustible building just before an explosion occurred. The vapors are believed to have exploded on reaching the oil burner in the boiler room. The roof and windows of the processing building were destroyed by the explosion, sprinkler piping was broken and fire broke out. Several first story windows in an adjacent 2-story building were blown out. Windows in two walls of a detached 1-story wooden warehouse were also blown out and fire developed in the interior of this building.

Firemen responded promptly and closed all sprinkler valves to conserve water for fire fighting. Reports do not comment on the effectiveness of sprinklers in the exposed warehouse when firemen arrived. If the fire was out of control of the sprinklers the fire department action in closing the valve would seem to be justified since the fire department report stated that there were no fire department connections by which engines could pump into the system. The warehouse was fifty per cent destroyed.

Winston-Salem Journal

Spray painting residues, large quantities of finishing materials in containers and an accumulation of flammable vapors from freshly painted furniture resulted in a rapid spreading fire that overpowered the dry pipe sprinkler system at this Winston-Salem, N. C. furniture factory on Feb. 14 (see story, page 278).

The Houston Chronicle

A welding torch being used near the inshore end of an 1,080-ft.-long wooden pier was the cause of this shipyard fire near Houston, Texas. The floating dry dock shown in flames in the background was moored to the pier when the fire started but floated into the ship channel when the moorings burned. (See report below.)

Shipyards

Jan. 10, near Houston, Texas, Todd Shipyards, Inc. $3,000,000

Pier with traveling crane, 12,500-ton-capacity dry dock. Sparks from a welding torch being used near the inshore end of the 1,080-ft.-long wooden pier started a fire beneath the wood deck that was not immediately noticed by the fire watch. Gas escaping from a leaking acetylene pipe beneath the pier deck may have been ignited by the welding sparks. In any case the fire spread rapidly before an offshore wind and by the time land apparatus, fireboats and coast guard boats arrived had involved most of the pier and had spread to an old wooden dry dock moored to the pier. In a short time the moorings burned through and the burning dry dock floated into the ship channel. It finally came ashore on marshland and set fire to 50 acres of salt hay.

The dry dock fire burned itself out as land and water fire companies concentrated on confining the pier fire to the undivided and unsprinklered pier of origin. Because of the age and poor repair of the pier and dry dock the quoted loss figures, released by the shipyard owners, are considered excessive.

Woodworking

Boats

*July 7, Mahone Bay, N. S., Industrial Shipping Co., Ltd., et al. $596,500

Molded plywood motor boats. Seven of a group of wooden 1-story buildings acquired from war assets following World War II and subsequently used for the manufacture of molded plywood motor boats were destroyed by fire that was beyond control in the building of origin when discovered by the watchman at 3:00 A.M. The fire originated in the glueing room in which plywood hulls, after being coated with a resin dissolved in methyl alcohol, were left until the alcohol had evaporated. It is presumed that alcohol vapors that accumulated in the glueing room were ignited by any one of several ignition sources. High winds, lack of fire divisions and sprinklers and the closeness of the buildings to each other all contributed to the destruction of the seven factory buildings and two nearby dwellings.

The fire chief does not feel that the watchman should be criticized for not discovering the fire earlier because of the length of his rounds and his other responsibilities.

*Fire spread to other buildings.

Building Supplies

March 10, Shreveport, La., Olin-Mathieson Chemical Corp. $1,000,000

Hardwood flooring. During the installation of electrical equipment on the first floor of this sprinklered 50,000 sq. ft. 1-story wooden building, hot metal or sparks from welding operations dropped through a belt hole into the basement where wood dust and oil drippings were ignited. Fire spread so quickly through the basement ahead of fusing sprinklers that more fused than the system was designed to supply. Firemen found fire beyond control in the undivided and dusty building. One report stated that sprinkler piping had collapsed before a pumper connection could be made to the system. Although hampered by inadequate water supplies, firemen confined the fire for the most part to the building of origin.

Furniture Factories

Feb. 14, Winston-Salem, N. C., B. F. Huntley Furniture Co., Inc. $2,000,000†; 1 killed

Bedroom furniture. One employee died and five 2- and 3-story brick, wood-joisted sections comprising about 50 per cent of the plant were destroyed by fire that originated at a spray shield in the top story of a 3-story section. Having just arrived at the plant to ready it for the day's operations one of a small group of employees turned on the lights in the finishing room. Fire almost at once broke out at the spray shield and although it was attacked at once with carbon dioxide extinguishers, spread so rapidly through the finishing area that the employees had to flee. One who later returned for his personal belongings was trapped and killed.

Dry pipe sprinkler systems were installed throughout the plant. A combination of factors, many of which seem to be common to spray finishing areas in furniture factories, contributed to the rapid spread of fire. These included spray residues around spray areas, large quantities of finishing materials in containers, flammable vapors from freshly finished furniture on conveyors (ventilation systems at the plant were not kept in operation at night). Investigators believe that these factors resulted in a fire that spread rapidly ahead of fusing sprinklers and very quickly opened so many that the available water supply was overtaxed. It should be noted that the systems were installed to portect an ordinary hazard and were dry pipe.

†Figure includes business interruption loss.

Shreveport Fire Department

Wood dust in the basement of this Shreveport, La. wood flooring mill permitted fire started by welding sparks to spread so rapidly that more sprinklers fused than the sprinkler system was designed to supply simultaneously. (See report at top of page.)

New Hampshire Board of Fire Underwriters

A defective motor for a spray booth exhaust fan was the reported cause of fire at this Keene, N. H. furniture factory. Fire flashed from the booth to a long unsprinklered combustible drying tunnel. Sprinklers near the ends of the tunnels operated but had no effect on the fire in the tunnel. Soon so many sprinklers had fused that the poor water supply was overtaxed. (See fire report below.)

*Feb. 21, Keene, N. H., Sprague and Carleton, Inc., $1,125,000

A defective motor that drove an exhaust fan in a spray booth duct caused fire that originated when an employee switched on the motor preparatory to spraying lacquer in the booth. Fire flashed from the booth of origin to an adjacent booth and quickly entered three 60-ft.- to 80-ft.-long unsprinklered combustible drying tunnels through which furniture was being conveyed to and from spray booths. Flames spread so fast employees could not use extinguishers.

When the tunnels were installed a fire wall was completely removed instead of passing the tunnel through the wall and providing a water curtain or other protection against fire spread through the wall opening. Sprinklers in the vicinity of the ends of the tunnels operated but had no effect on the fire in the tunnels and soon so many sprinklers had opened in the undivided 240 ft. by 56 ft. second story of the 2-story brick, wood-joisted building that the water supply from a looped 6-in. city main was overtaxed. Tests made after the fire indicated that with 30 sprinklers operating the residual pressure would be about zero. Many more than 30 heads undoubtedly fused in the very early stages of the fire.

*Fire spread to other buildings.

Connecting a hose to the nearest hydrant, fire fighters got no water. Hose streams were eventually supplied by pumpers connected to hydrants 800 ft. to 100 ft. away but most effective use of the water could not be made because the sprinkler system had no pumper connections.

Fire destroyed the second story and roof of the building of origin and an adjoining building, completely destroyed an adjoining and communicating 3-story brick, wood-joisted building, and burned off the roof of two other adjoining buildings. All of the buildings were sprinklered.

Saw and Planing Mills

Jan. 12, Marquette, Mich., Munising Wood Products Co., Inc. $510,500

Sawmill, furniture dimension stock, miscellaneous small wooden articles. On the day of the fire it had been decided to remove gummy sludge from a paraffin impregnating tank that extended from the basement to the first story. In the past water had been used to wash out the tank but on this occasion a flammable solvent was used. Investigators believe that vapors in the tank were ignited by an ordinary light bulb suspended in the tank. Flames flashed from openings in the bottom and top of the tank and quickly

enveloped the basement and first story where 59 and 96 sprinklers opened on the dry pipe system.

The volume of water required to supply the 155 sprinklers that fused simultaneously was more than the system was designed to supply and consequently the system was immediately overpowered.

Fire spread through an open stairway to the second story of the 2-story section of origin. Fire doors in a division wall closed automatically to prevent extension to the first and second stories of an adjoining 4-story section. However, doors left open on an elevator shaft common to both sections allowed fire to extend via the shaft to the third and fourth stories of the 4-story section. It is open to conjecture whether an extra hazard wet pipe system would have discharged water quickly enough and in sufficient quantity to check this rapid-spreading fire.

Firemen took hose lines into the section of origin but soon had to abandon them in the face of the intense fire. There were no fire department connections on the sprinkler systems.

Fire spread through unprotected fire wall openings to four communicating sections and would have continued through the rest of the 167,000 sq. ft. plant but for the action of fire fighters who took up positions at fire wall openings and prevented further spread.

Aug. 3, Everett, Wash., William Hulbert Mill Co. $750,000

Cedar siding mill. Fire that originated between two large planers shortly after the mill closed for the night spread beyond the control of sprinklers and destroyed the large 1-story wooden building and six adjacent dry kilns. Inadequate design of the sprinkler system to protect hazards associated with a woodworking plant accounted for failure of sprinklers to control this fire. The dry pipe sprinklers at the mill were supplied by a 6-in. connection (with an unapproved meter) to a 12-in. circulating city main under 100 psi static head. A 75,000-gal. elevated tank provided 16 psi static pressure at the highest line of sprinklers. Taking into consideration the small pipe sizes of the old sprinkler system and a 24 psi head loss at the unapproved meter, there was an estimated 1,000 gpm available for sprinklers at adequate pressures.

On seeing smoke coming from the mill three employees ran inside, one of them pulling a fire alarm box on the way, and

Everett Daily Herald

Inadequate design of the sprinkler system to cope with the type of fire that could develop in a woodworking plant allowed fire to spread throughout this cedar siding mill at Everett, Wash. on Aug. 3. Full report starts on this page.

discovered an intense fire in the vicinity of two planing mills. A large number of sprinklers were operating. During the next two or three minutes, however, while the men were getting a standpipe hose in operation, the fire spread rapidly and had involved most of the dusty building (no fire walls or draft curtains) by the time they returned. Investigators believe that 900 sprinklers fused in the first few minutes, overpowering the water supply.

The first engine companies tried to take suction from yard hydrants but got no water so had to relocate. One company tried to pump into the sprinkler system but the heat forced them to retreat.

With two sides of the mill inaccessible due to water (the building was built on piles over tide flats) Everett firemen were severely handicapped but with the aid of mutual aid companies and favorable weather conditions kept the fire from other mill buildings.

Industrial Fires with Losses from $250,000–$500,000

Asphalt Roofing

April 14, Perth Amboy, N. J., Bonafide Genasco, Inc. $367,000†

Brick and Tile Works

July 24, near Greentown, Ohio, Natco Corporation. $325,000†

Chemical Plants

March 9, near Joliet, Ill., National Cylinder Gas Co., et al. $310,000†

March 20, Cleveland, Ohio, Gibson-Homans Co. $445,000† (*Photo, page 263*)

June 13, Fostoria, Ohio, Union Carbide and Carbon Corp. $292,000

July 24, Montreal, Que., Herdt and Charton, Inc. $280,000; 1 killed

*Aug. 6, Niagara Falls, N. Y., Olin-Mathieson Chemical Corp. $250,000; 3 killed

Fertilizer Warehouse

Jan. 30, Perry, Iowa, Davidson Chemical Co. $250,000†

Food and Food Products

Animal Foods

Jan. 24, Walton, N. Y., Crawford Bros., Inc. $462,500

March 4, Atlanta, Ga., Atlas Feed Mills. $345,000

April 24, Berlin, Md., Berlin Milling Co. $450,000

Sept. 8, Bellflower, Calif., Triangle Grain Co. $443,500

*Nov. 20, Amarillo, Texas, Ralston Purina Co. $370,000 (*Photo, page 265*)

Dec. 30, Atascadero, Calif., Poultrymen's Cooperative Ass'n. $265,000

Bakeries

June 9, Washington Court House, Ohio, Pennington Brothers Bakery. $311,500

Beverages

March 9, Marion, Ill., Marion Bottling Co. $302,000

Candy

June 25, San Francisco, Calif., Blums Candy Co. $250,000 plus U & O

*Fire spread to other buildings.

Canneries

*Jan. 28, Cairo, Ga., W. B. Roddenberry Co., Inc., et al. $457,000

Feb. 2, Oakedale, Wash., Inland Empire Pea Growers Ass'n. $435,000

March 31, Brownsville, Wis., Brownsville Canning Co. $407,500†

Aug. 26, Fort Lupton, Colo., Kuner Empson Tomato Canning Co. $440,000

*Nov. 25, Dexter, Me., George H. Hale and Sons. $275,000

Coffee Powder

July 10, Jamaica, N. Y., Sol Cafe Manufacturing Corp. $300,000†

Fish Processing

Jan. 17, Juneau, Alaska, Juneau Cold Storage. $280,000

*Aug. 17, Gloucester, Mass., Robert and Melvin Kersey, et al. $450,000

Flour Mill

June 22, Jackson, Tenn., Model Mills, Inc. $351,000

Fruit Packing

May 15, near Yakima, Wash., Pyramid Orchard Warehouse. $498,000 (*Photo, page 267*)

Meat Packing

Jan. 28, Jersey City, N. J., Swift & Co. $250,000

*Feb. 13, Toledo, Ohio, Hygrade Products Corp., et al. $350,000; 3 killed

Potato Chips

Jan. 6, Tweed, Ont., W. T. Hawkins Co., Ltd. $277,000

Glassworks

July 15, East Palestine, Ohio, John E. Kemple Glass Works. $289,000

Sept. 26, LaVale, Md., Cumberland Glass Co., Inc. $400,000 (*Photo, page 268*)

Metalworking

Aluminum Extrusion

Dec. 27, Newnan, Ga., William L. Bonnell Co., Inc. $250,000; 3 killed (*Photo, page 268*)

†Figure includes business interruption loss.

Automobile Assembly

Jan. 27, Long Beach, Calif., Ford Motor Co. $485,000 *(Photo, page 269)*

Electrical Appliances, Equipment

Feb. 2, Baltimore, Md., Baltimore Air Coil Co. $345,000

*Aug. 24, Los Angeles, Calif., Televideo Corporation of America. $250,000

Engine Rebuilding

Dec. 16, Montreal, Que., Master Motor Manufacturing, Ltd. $472,500

Iron Foundries

May 3, Fort Erie, Ont., Hart and Cooley Manufacturing Co. $289,000

Aug. 1, Los Angeles, Calif., Wilshire Manufacturing Co. $300,000

Machine Shops

Feb. 24, Richmond, Va., The Tradegar Co. $250,000

*May 12, Vancouver, B. C., Pacific Bolt Manufacturing Ltd., et al. $457,000

Sept. 1, Indianapolis, Ind., L. C. Products, Inc. $250,000

Steel Fabrication

Jan. 22, Montreal, Que., Canadian Vickers. $400,000

Feb. 19, Peoria, Ill., Peoria Metal Specialty Co. $402,000†

Feb. 29, Middletown, Ohio, Prior Products, Inc. $320,000

Mar. 19, near Newport, Ark., Palace Homes, Inc. $309,500†

April 20, Linden, N. J., Volupte, Inc. $299,500

May 1, Bushnell, Ill., Illinois Culvert and Tank Co. $258,000†

*Dec. 26, Falls Church, Va., Jenkin's Sheet Metal, Inc., et al. $300,000

Dec. 26, Hanover, Pa., Thompson Trailer Corp. $400,000

Steel Forging

Aug. 13, Indianapolis, Ind., Indianapolis Drop Forging Co. $265,000

Railroad Repair Shops

May 21, Winnipeg, Man., Canadian National Railways. $259,000

June 12, St. Paul, Minn., Great Northern Railway. $325,000 *(Photo, page 271)*

Mining

Feb. 6, Plains Twp., Pa., Adonizio Brothers, Inc. $300,000 *(Photo, page 273)*

May 19, Millstone, Ky., South East Coal Co. $261,500†

*Oct. 15, Cobalt, Ont., Cobalt Consolidated Mining Corp. $400,000

Paper Working

April 5, Cleveland, Ohio, Apex Paper Box Co., et al. $281,500†

May 17, Kankakee, Ill., Fibre Drum Co., Inc. $250,000

May 31, South Bend, Ind., United States Gypsum Co. $477,000 *(Photo, page 274)*

Sept. 9, Denver, Colo., Continental Paper Products Co., et al. $335,500†

Oct. 2, Baltimore, Md., Oriole Paper Box Co., et al. $250,000 *(Photo, page 275)*

Plastics Fabricating

Feb. 19, Springfield, Ohio, Western Tool and Manufacturing Co. $290,000†

April 24, Los Angeles, Calif., General Plastics Corp. $350,000

May 17, Grabill, Ind., Crosby Aeromarine. $296,000†

Pottery

Feb. 18, Los Angeles, Calif., Sierre Columbia Co. $250,000

Refineries — Petroleum

July 29, near Sun Ray, Texas, Shamrock Oil and Gas Co. $450,000; 19 killed

Oct. 5, Warren, Pa., United Refining Co. $260,000

Textile Working

May 7, Philadelphia, Pa., D. Frankil Estate, et al. $297,500†

*June 18, West Sand Lake, N. Y., Union Piece Dye Works, Inc. $494,000†

Aug. 30, Madison, N. C., Sharnay Hosiery Mill, $330,000

Woodworking

Boats

Sept. 15, Sea Bright, N. J., Zobel's Sea Skiff and Yacht Works. $250,000

Building Supplies

*March 1, Willowbrook, Calif., Slattery Hardware Co. $264,500

*July 3, Collegedale, Tenn., Collegedale Wood Products Co. $260,000

Furniture Factories

*July 11, Paris, Ont., Sanderson-Harold Co., Ltd. $400,000

Oct. 18, Philadelphia, Pa., Fogel Refrigerator Co. $275,000

Nov. 8, Lock Haven, Pa., R. K. Griffin Co. $300,000

Dec. 6, Frisco City, Ala., Frisco Manufacturing Co. $310,000

Saw and Planing Mills

July 14, Wright City, Okla., Dierks Lumber and Coal Co. $400,000

July 27, Canoe, B. C., Federated Co-op Sawmill. $400,000

Aug. 25, near Myers Flat, Calif., John Tsarnas. $250,000

Oct. 6, near Odell, Ore., Neal Creek Lumber Co. $262,000

Dec. 3, Donald, B. C., Selkirk Spruce Mills, Ltd. $490,500†

*Fire spread to other buildings.

†Figure includes business interruption loss.

53 Large Loss Store Fires

The number of store fires during the past three years has been fairly constant — 53 in 1956, 50 in 1955 and 54 in 1954. The 53 fires last year caused a loss of $24,109,000, took three lives and caused 105 injuries (100 fire fighters, 50 others). Multiple occupancy mercantiles (several stores in one building) accounted for 21 fires. Department stores experienced 12 fires (7 in 1955), supermarkets 6 (7 in 1955), restaurants 5 (3 in 1955), furniture stores 4 (9 in 1955) and clothing and dry goods stores 3 (5 in 1955), food and grocery stores (except supermarkets) 2 (4 in 1955).

Majority at Night

As in past years a large majority of the fires originated during the night when the stores were closed. Since none of the buildings were protected by a sprinkler system, since only three had watchman protection and only one an automatic fire alarm system, it is not surprising that detection was delayed in all of the 43 fires that broke out in nonoperating periods and in three of the ten fires that occurred when the stores were open.

A building in Detroit housing a restaurant and clothing store suffered a large loss fire despite the fact that it was protected by a central-station-supervised automatic fire alarm system. This fire originated above the second story ceiling and had made considerable headway in the concealed ceiling space before breaking into the open and operating the detection system.

An elderly watchman for a multiple occupancy building at Williamstown, N. J. lit a trash fire in the rear yard before going home for lunch. At a Tulsa, Okla. department store the watchman smelled smoke but on finding no fire continued on his route. Twenty minutes later, on his return to the first floor, he saw fire spreading along clothing on racks on the mezzanine. The watchman for the supermarket near Charlotte, N. C. discovered the fire promptly, but it spread quickly out of control as he telephoned the alarm. These latter two fires testify to the speed with which fires can develop and spread in stores.

Customers Endangered

The ten large loss store fires that occurred while the stores were open for business should serve as a warning to store operators that conditions are apt to be right for a rapid spreading fire that could trap customers and employees. One life was lost in these ten fires (restaurant, Kearny, N. J.), and there were several close calls, as in the department store at Kewanee, Ill., the supermarket at Tulsa, Okla., and in the department store at Ogdensburg, N. Y.

Building Features

The combustibility of the contents has already been alluded to as an important factor influencing fire spread in stores. There are also several weaknesses in the fire safety of the store building itself that are prevalent in stores suffering large loss fires. In the 53 fires last year there were 38 instances of fires spreading laterally from the area of origin to other parts of the same floor because of horizontal openings and 33 instances of fires spreading to other floors via unprotected vertical openings. The most frequent recurring weaknesses in building design influencing fire spread were open stairways (18), lack of fire divisions for excessively large areas (18), large undivided attics (11), nonfire-stopped walls (9), and open elevator shafts (8).

Of the 16 fires that spread to neighboring buildings 8 did so because of poorly constructed party walls (clothing store fire, Trenton, N. J.), five entered exposures through plain glass windows (multiple occupancy fire, Glens Falls, N. Y.), one spread to an exposure

due to combustible construction without separation by space or masonry walls (department store, Buchans, Nfld.), one because of unprotected openings in a party wall (Scottsbluff, Nebr.).

Clothing and Dry Good Stores

April 24, Dayton, Ohio, The Joseph Thal Co., et al. $924,000†

Women's wear, shoes. Defective wiring above the third story ceiling was, in the opinion of fire department investigators, the cause of fire that destroyed most of the third and fourth stories and roof of the unsprinklered 14,850 sq. ft. 4-story brick, wood-joisted building. Discovery was made by a passerby who saw smoke coming from upper floor windows at 6:10 P.M., ten minutes after the store had been locked up for the night. Fire was then spreading through concealed ceiling and wall spaces and later broke through the roof which eventually collapsed. Fire did not extend below the third story although water damage to all stock was heavy.

†Figure includes business interruption loss.

Bob Doty

There was no private fire protection for this Dayton, Ohio clothing store during nonoperating periods (see story above).

Department Stores

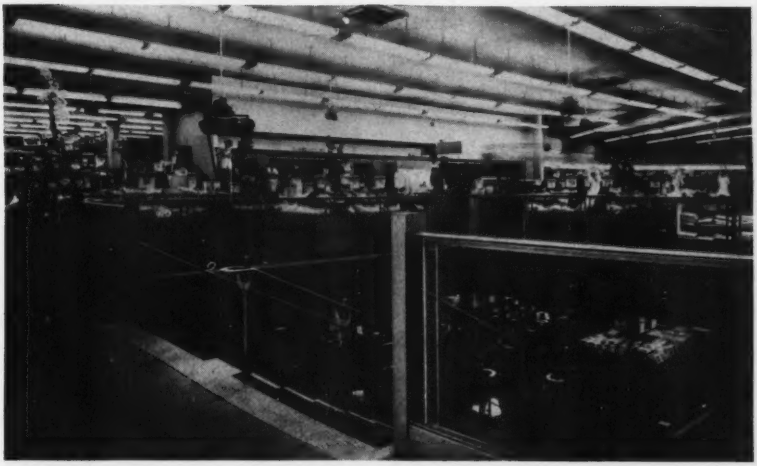
May 12, Cleveland, Ohio, Federal Department Store. $1,000,000

Although evidence is lacking it is the consensus of investigators that lightning struck the 50-ft.-high masonry advertising tower above this mostly 1-story fire-resistive building and traveled within the tower to the basement where it started a fire. The tower had no lightning protection.

At 10:30 P.M., 40 minutes after the height of the storm, a passerby noticed smoke coming from the unoccupied and unprotected 50,800 sq. ft. building and gave the alarm. Firemen were confronted with an intense fire in the furniture, rug and electric appliance department in the basement and smoke and heat coming up into the first story through a large open stairway which was the only access to the unsprinklered windowless basement. Despite severe punishment, fire fighters attacked the fire from this stairway and gradually worked their way down into the basement. Actual fire damage was confined to about one-third of the basement but smoke and heat damage was so severe that loss to contents was practically total.

Nov. 17, Rochester, Minn., J. C. Penney Co. $500,000

Firemen responding to a passerby's alarm at 7:08 P.M. for fire in the basement could not enter the basement via an open stairway leading down from the first story because of smoke and heat, and were prevented from entering the basement through a doorway in the rear alley because of the precautions that had been taken to prevent unauthorized entry. Double metal doors were double barred with heavy angle irons and double padlocked. Cutting torches were used without success and eventually the doors were pulled open by an auto towing truck. During the 45 minutes required to get the doors



Perlite Institute

Fire believed caused by lightning broke out in the basement (lower level in upper photo) of this Cleveland, Ohio department store. Summoned by a passerby, firemen worked their way down through heat and smoke coming up the open stairway and managed to confine fire damage to about one third of the basement (lower photo). One factor in the fire fighters' favor was the absence of concealed wall and ceiling spaces through which the fire might have spread. The fire occurred on May 12 and is reported on page 284.

open fire had spread from the stock room in the unsprinklered basement and was extending upward through hollow partitions.

A defective exhaust fan motor in the basement was the probable cause of the fire.

*Nov. 28, Ogdensburg, N. Y., J. J. Newberry Co., et al. $1,000,000

While the basement, first and second story sales areas were crowded with shoppers fire broke out in the second story on a 30 ft. by 4 ft. counter on which cellophane-wrapped wooden and plastic toys were displayed. Careless smoking was the apparent cause. An attempt was made to extinguish the fire with portable extinguishers but flames extended to a nearby display of highly flammable dolls (one report indicated that the dolls were made of pyroxylin plastic) and to other combustible stock and spread rapidly along display tables.

The alarm was reportedly telephoned promptly at 12:27 P.M., and evacuation of all customers was completed without incident with the supervision of store personnel. Dense smoke prevented first arriving firemen from entering the building and although additional alarms, including mutual aid calls, were sent the fire spread up through the undivided and unsprinklered 4-story brick, wood-joisted building.

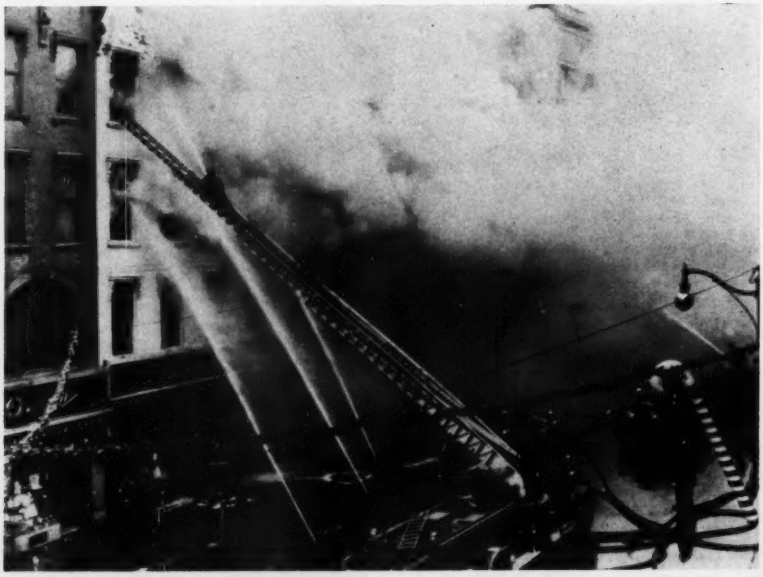
At 1:30 P.M. the sprinkler alarm operated in the adjoining 4-story brick, wood-joisted building occupied by another department store. Investigation revealed that the fire had extended to the roof and that the sprinklers in the top story were operating. These and fire department hose streams confined damage to the roof. The fire had extended to the roof either by jumping the 1-ft.-high parapet on the party wall or by igniting joists resting in the party wall.

*Fire spread to other buildings.

Dec. 18, Chicago, Ill., Goldblatt Bros., Inc. $1,228,000†

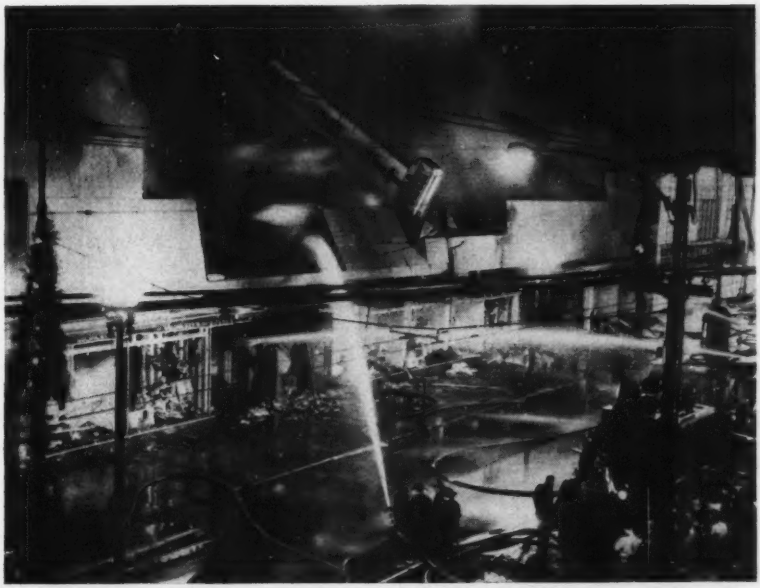
Fire of undeteremined cause originated in the 3 ft. by 15 ft. high undivided concealed space between the wood roof deck and metal

†Figure includes business interruption loss.



Wide World

While the sales areas were crowded with shoppers fire broke out on a display counter on the second floor of an Ogdensburg, N. Y. department store on Nov. 28. All customers left safely under the supervision of store personnel as the fire spread rapidly along display tables (see report this page.)



Wide World

An estimated 1,500 customers were in this Chicago, Ill. department store when fire was heard burning in the concealed space between the roof and ceiling. All customers left in an orderly manner but the fire broke through the ceiling before all employees had left, forcing them to flee without their personal belongings. This fire is reported on page 286.

lath and plaster ceiling of the unsprinklered 41,500 sq. ft. 1-story masonry, wood-joisted building. Due to the absence of automatic protection the fire was not discovered until employees heard a crackling sound overhead and noticed falling plaster at 7:54 P.M. The alarm was telephoned at once and the 1,500 customers left in an orderly manner. However, fire broke through the ceiling before all employees had left forcing them to flee without their personal belongings.

A masonry division wall with protected openings separated the 30,000 sq. ft. section of origin from the rest of the building. When firemen arrived the roof space above the 30,000 sq. ft. section was totally involved and shortly thereafter weakened roof supports allowed the roof to fall in. Firemen attempting to ventilate the roof were ordered off minutes before it collapsed. Destruction of the section of origin was total but due to the combined action of the fire wall and fire department action the adjoining section was saved.

Furniture

Oct. 19, Dayton, Ohio, Rossiter-Jarrett-Harman Co., et al. $941,000†

New furniture, pianos, radio repair. The fourth story and roof of this 13,000 sq. ft. 4-story brick, wood-joisted building were destroyed by fire that originated in the concealed space between the third story ceiling and the fourth story flooring. Straw and other types of upholstering padding that had accumulated in the concealed area were believed to have been ignited by defective and deteriorated wiring.

Since the building had no automatic or watchman protection the fire was not detected until a passerby saw flames coming from the fourth story windows at 8:50 P.M. Fire department officials believe the fire had been smoldering from 10 to 12 hours before windows in the fourth story broke and fire enveloped this story. Lack of automatic protection was responsible for a large loss.

†Figure includes business interruption loss.

Using three 3-in., 13 2½-in. and 8 1½-in. hoses, firemen confined fire damage to the top story. Heavy smoke and water damage accounted for much of the loss.

Multiple Occupancy Stores

Feb. 10, Patchogue, N. Y., Mills Building $732,000†

Six stores first floor, offices and apartments on upper floors. At 2:46 A.M. police noticed smoke coming from the first story of the old 4-story wooden building and gave the alarm. They then roused the four occupants of upstairs apartments in time for all to escape.

The fire originated in the basement and had been burning an hour according to estimates before discovery. Fire department response was delayed somewhat by the fact that another fire was in progress at the time but this delay was probably of no great significance since the fire had already made considerable headway before discovery and spread up through the building.

Masonry fire walls were credited with saving the adjoining brick, wood-joisted exposed buildings.

†Figure includes business interruption loss.

April 15, Winnipeg, Man., J. G. Fraser Ltd., et al. $500,000

Art supplies, furs, jewelry, bowling alleys, offices. At 10:25 P.M. an occupant of a second story office working Sunday evening saw smoke coming from around pipes and from the edge of the baseboard. Firemen responded promptly to his telephoned alarm and discovered fire in the rear of a first story art supplies store. Efforts to put out the fire proved futile, however, since it had already entered nonfirestopped walls and was spreading up through the unsprinklered 3-story brick, wood-joisted building. About midnight fire broke through the roof.

Winnipeg Free Press

Originating in the rear of a first story store that was closed for the weekend, fire entered nonfirestopped walls and was spreading up through the 3-story brick, wood-joisted building when firemen arrived. The unsprinklered multiple occupancy mercantile building was in Winnipeg, Manit. and the fire occurred on April 15, 1956. (See report, this page.)

Wide World

Originating in a first story store, fire entered and spread through joist channels and other concealed spaces to all parts of this unsprinklered 4-story brick, wood-joisted store and office building in Philadelphia, Pa. on December 28 (see report, page 290).

June 25, Maywood, Ill., Bahcoll Hardware Co., Inc., et al. $850,000

Hardware store, plumbing supplies shop, grocery store. A defective incinerator was the reported cause of fire that destroyed this unsprinklered 350 ft. by 200 ft. 2-story brick, wood-joisted building. The fire originated in the not-cut-off room on the first floor housing the incinerator and was coming from the roof when seen by a motorist at 8:42 P.M. The extent of the fire before discovery, absence of windows in walls near the heaviest concentration of fire and lack of standard height parapets on division walls were the principal reasons, in the opinion of the fire chief, why his men could not save the huge building.

June 25, Totowa, N. J., Windsor Fifth Ave. Corp., et al. $500,000

Self-service sale of clothing, toys, hardware, household furnishings. Reports indicate that the fire that destroyed this 48,000 sq. ft. 1-story masonry, wood-joisted building originated when a piece of textile in the household furnishing department was picked up and caught in a ceiling ventilating fan. The textile ignited at the fan, fell to combustible stock on display after which fire spread rapidly through the undivided and unsprinklered building. Congested stock and the continual operation of the air circulation system helped spread the fire.

It was considered fortunate that the rapid spreading fire occurred at a time when relatively few customers were in the store. Limited exit facilities due to the check-out self-service system could have resulted in large loss of life under crowded conditions.

*July 9, Springfield, Ill., Fisher Grocery Co., et al. $615,500

Grocery, department store, restaurant, other retail stores. Three 2- and 3-story brick, wood-joisted buildings were destroyed

*Fire spread to other buildings.

and two were damaged by fire that broke out in the mercantile district during the night. The fire originated in a rear alley in an area not visible from the street, and because of the absence of private fire protection was not discovered by a passerby until 1:15 A.M. By then flames had entered an unsprinklered 2-story brick, wood-joisted building through plain glass windows and had involved the rear half of the building.

There was no hope of saving the building of origin, and when embers showered the roofs of neighboring buildings and heat broke plain glass windows in walls of adjacent exposures firemen were confronted with a potential conflagration. Fire destroyed two adjacent unsprinklered buildings and damaged two others but fire fighters with the help of streets to serve as fire breaks managed to prevent more widespread damage.

Aug. 28, Lower Nazareth Twp., Pa., Farmers Market and Auction. $1,000,000

Seventy-five concessions (clothing, food, hardware). Fire was beyond control in this 600-ft.-long 1-story building when discovered by outsiders at 9:05 P. M. Early in the evening neighbors saw lightning strike the rambling structure, suggesting lightning as a possible cause. Whatever the case, the fire spread throughout the building due to absence of sprinklers, watchman protection and division walls.

*Nov. 25, Russellville, Ala., V. J. Elmore, et al. $500,000

Five and ten cent store, flower shop, clothing store, automobile appliances, bank. Fire that is believed to have originated at refrigeration equipment in the basement for a first floor flower shop was not detected until 1:50 A.M. by a policeman. By then the fire had made too much headway in the undivided and unsprinklered 60,000 sq. ft. 2-story brick, wood-joisted building to be controlled by the local fire department. The heavy concentration of Christmas stock in the five and ten cent store, oily floors and high winds helped spread the fire through the building. Two adjoining 1-story buildings were ignited when walls of the building of origin fell.

Dec. 28, Philadelphia, Pa , Press Building. $1,000,000

36 stores, offices and shops. This old unsprinklered 4-story brick, wood-joisted building, of a type no longer permitted to be built by the city's building code, was destroyed by fire that apparently originated in a first story store. The fire was discovered by an employee of the first story store at 10:30 A.M. The first engine company to arrive entered a shoe repair shop but was immediately driven out as a burst of flames enveloped the shop. In the meantime ladder companies were assisting with the safe evacuation of the building.

Heavy acrid smoke prevented firemen from working inside the building as the fire spread through joist channels and other concealed spaces, eventually involving all stories of the 65,000 sq. ft. building. Thirty engine companies and eight ladder companies confined the fire to the building of origin.

Restaurants

*Feb. 7, East St. Louis, Ill., Publix Cafeteria, et al. $696,000

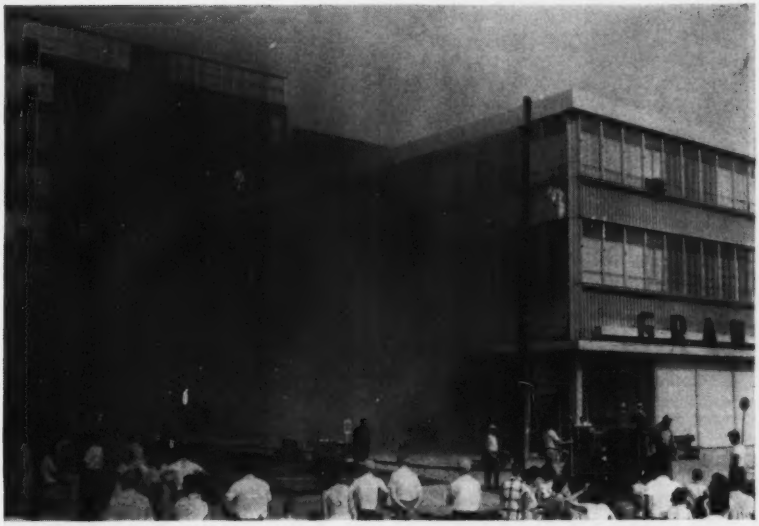
Restaurant, stores, offices. Three unsprinklered 2-story brick, wood-joisted buildings in the retail mercantile district were destroyed by fire that apparently originated in the rear of a restaurant A passerby discovered the fire shortly after 2:00 A.M. and walked two blocks to a fire station, neglecting to use a fire alarm box diagonally across the street from the fire. When firemen arrived the fire appeared to be confined to the rear of the restaurant but a few minutes later a series of explosions occurred in the basement and fire spread rapidly through the building. The fire chief attributed these explosions to gas escaping from gas-fired devices in the basement.

After breaking through the roof, fire jumped a 12-in. parapet to the roof of an adjoining 2-story building. Fire also entered this building from a fire involving a transformer on a pole in the rear. Fire in the two buildings entered a third building that backed up to them via plain glass windows. Other exposed buildings were saved by fire department hose streams and exposure protection in the form of blank party walls, wired glass windows and clear spaces.

May 2, Detroit, Mich., Fred J. Sanders Co., et al. $669,000

Restaurant, clothing store. The upper four stories of the unsprinklered 6,000 sq. ft. 6-story brick, wood-joisted building were practically destroyed by fire that apparently

*Fire spread to other buildings.



Paterson Evening News

On discovering fire in the basement of this East Paterson, N. J. supermarket at 2:00 P.M. on July 23, employees elected to fight the fire with extinguishers instead of calling the fire department. Had professional fire fighters been called at once they probably could have confined the fire to the basement. Employees emptied eight soda-acid extinguishers attempting to control the fire before calling the fire department. (See report, this page.)

originated in a concealed space above the second story ceiling in the vicinity of an open stair shaft. The fire was discovered almost simultaneously at about 6:14 P.M. by an elevator operator and the central-station-supervised automatic fire detection system which protected all stories.

Although the fire did not seem to be of sufficient magnitude to alarm customers and clerks of the restaurant in the basement and first story (the clothing store had closed for the night) the fire had apparently made considerable headway above the second story ceiling before discovery. Firemen took hoses up into the building but were soon forced out by smoke and heat. Fire broke into the open in the vicinity of an open stairway and within 15 minutes of the first alarm, four additional alarms were sounded as it became evident the fire would break through the roof and threaten an adjoining 14-story fire-resistive building. Hose lines directed from exposure windows above the fire and open sprinklers at windows supplied through a standpipe by a pumper kept fire from entering the exposure.

Supermarkets

July 23, East Paterson, N. J., Grand Union Co. $500,000

This fire would have been confined and extinguished in the basement records room where it started if the basement had been sprinklered or had store employees been schooled in the proper steps to take in case of fire. On discovering the fire about 2:00 P.M. employees emptied eight soda-acid extinguishers on the blaze and only after it became evident that they could not keep the fire from spreading to congested stock stored in the basement did they give the alarm. Had professional fire fighters been called at once it is reasonable to believe that they could have gotten into the basement with a hose and knocked down the fire before it spread up a stock conveyor to the first story.

Several customers were in the store. Instead of rushing for the exits they tried to continue their shopping and demanded to be checked out. None of the 150 customers and employees were injured.

Kankakee Daily Journal Co.

This supermarket in Kankakee Township, Illinois was a total $300,000 loss for the lack of automatic protection. Dec. 5, 1956.

Store Fires with Losses from $250,000–$500,000

Clothing and Dry Goods Stores

*Jan. 6, Trenton, N. J. Morlee Shops, Inc., et al. $255,000

*Jan. 27, Drummondville, Que., Dubois and Pare. $250,000

Department Stores

Jan. 7, Washington, N. C. McLellan Stores Co. $275,000

*Jan. 20, Buchans, Nfld., Buchans Retail Stores Ltd., et al. $330,000

Feb. 11, Franklin Square, N. Y., Franklin Square Department Store. $259,500

April 10, Tulsa, Okla., Seidenbach's, Inc. $395,000

*April 27, Spencer, W. Va., Spencer Department Store, et al. $350,000

May 19, Kewanee, Ill., Sears Roebuck Co., et al. $273,000†

*July 20, Scottsbluff, Nebr., Montgomery Ward and Co. $350,000

*Nov. 8, Bowling Green, Ohio, Montgomery Ward and Co. $437,500

Food and Grocery Stores

Feb. 3, Fredericton, N. B., Jameison Superette. $254,000

*Dec. 25, Marysville, Calif., Del Pero-Mondon Meat Co., et al. $250,000

Furniture Stores

*Sept. 15, Springfield, Ohio, People's Outfitting Co., et al. $385,000

Nov. 22, Cloquet, Minn., Stewart Furniture Co. $300,000

Nov. 30, Inglewood, Calif., Margent Home and Auto Supply, et al. $275,000

Multiple Occupancy Stores

Jan. 20, West New York, N. J., Golden Drug Store et al. $275,000

*Jan. 28, Columbiana, Ohio, Ben Franklin Five and Ten Cent Store, et al. $327,000†

Feb. 7, Lincoln Park, Mich., Rose Jewelers, et al. $295,000

March 1, Portsmouth, N. H., J. J. Newberry Co., et al. $250,000

*March 17, Glens Falls, N. Y., F. W. Woolworth Co., et al. $455,000

March 23, Denver, Colo., George Tritch Building. $250,000

March 28, Munsey Park, N. Y., Armand's Food Center, et al. $250,000

April 10, Colorado Springs, Colo., Krause Building. $420,000

April 18, Williamstown, N. J., Giant Sales Co., Inc., et. al. $250,000; 1 killed

May 30, Portland, Ore., Gilbert Bros., Inc., et al. $302,000; 1 killed

Sept. 8, Lynbrook. N. Y., Marie Antoinette Pastry Shop, et al. $250,000

Nov. 21, Huntington, W. Va., Goldsmit-Sydnor, Inc. $287,500

Nov. 27, Penn Twp., Pa., Pentlong Shopping Center. $250,000

Restaurants

April 28, Kearny, N. J., O'Hara's Restaurant. $255,000†; 1 killed

Nov. 6, Corpus Christi, Texas, Elbuh Grill. $300,000

Dec. 23, Charleston, W. Va., King's Restaurant, et al. $393,000

Supermarkets

April 25, Essex, Md., Acme Food Stores Co., et al. $318,000

May 20, Tulsa, Okla., Jitney Jungle. $282,000

Oct. 16, near Charlotte, N. C., Park and Shop Food Center. $300,000

Oct. 20, Tulsa, Okla., Safeway Stores, Inc. $305,000

Dec. 5, Kankakee Twp., Ill., Lloyd's Supermarket, et al. $300,000

*Fire spread to other buildings.

†Figure includes business interruption loss.

The 50 Largest Warehouse Fires of 1956

The 50 "large loss" warehouse fires in 1956 were nine more than in 1955 and four less than the record high of 54 in 1954. These 50 fires caused property damage totalling $29,661,000, took five lives (2 fire fighters, 3 warehousemen) and injured 83 (79 fire fighters, 4 warehousemen).

Detection Delayed in 43 Fires

In 43 fires (86 per cent) detection was seriously delayed. This statistic, more than any other, explains why so many fires reached large loss proportions. One part of the explanation for the large number of fires not discovered before they had spread out of control was the absence of watchman and automatic protection in 31 of the 44 warehouse fires that broke out when the warehouses were closed. Another factor responsible for delayed discovery was the unsatisfactory performance by 10 of the 12 watchmen. Lack of supervised rounds at hourly intervals was the basic cause of most of these watchman failures. Had the watchman in the building supplies warehouse at Kansas City, Kan., for example, been required to make supervised hourly tours he would not have been asleep when fire apparatus arrived at the building. Nor would a passing motorist have discovered the Dallas, Texas terminal warehouse fire before the watchman, had the watchman been required to check the warehouse frequently.

Eight Sprinkler Systems

The eight sprinklered warehouses suffering large loss fires were twice as many as in 1955. One of the systems performed satisfactorily but the others failed for the reasons indicated below.

There were two partial systems, one of which was in a shoe factory warehouse at Nashville, Tenn. This system did not protect the open space between the ground and floor where the fire started but after the fire burned up into the warehouse, sprinklers materially aided firemen in bringing the fire under control. The other partial system was in a building supplies warehouse at Salem, Ind. This fire also started in an unsprinklered area, an addition to the main sprinklered warehouse. On bursting into the communicating sprinklered area the fire opened so many sprinklers that the protection was overpowered.

Improper storage methods were the principal reasons for the failure of three of the six complete sprinkler systems to control the fires. These three were at cotton warehouses at Leachville, Ark., and Gurdon, Ark. and a toilet goods warehouse at Jeffersonville, Ind. At Gainesville, Texas, sprinkler protection was not returned to service after a fire on the day preceding the large loss fire. Sprinkler protection at a scrap metal warehouse at Rockford, Ill., was overpowered when an exposure fire entered and spread through nonfire-stopped wall and ceiling spaces out of range of sprinklers; and at a textile warehouse at Columbus, Ga., sprinklers were shut off before the fire was out.

Division Walls Needed

The warehouses in which the 49 building fires occurred (one fire involved yard storage) were in 34 cases 1-story structures and were principally of combustible construction (only six were of noncombustible or of fire-resistive construction. In certain isolated instances the combustibility of the building was an important factor in the extent of damage, e.g., scrap metal warehouse, Rockford, Ill., but in most of the fires it was the combustible contents that provided the fuel and in these cases the fires could have developed into large losses whether the buildings had been built of wood or concrete.

Although the type of building material did not usually determine the

size of the fire, there were certain other features of the buildings that were vital factors. Warehousemen recognize the value of large undivided areas for efficient storage but they apparently do not recognize the fact that the more material that is crammed into a single storage area the more material is subject to destruction by a single fire. In 42 of the warehouses division walls were not installed where prudent fire protection engineering would have called for them. In the 15 multistoried buildings fires involved more than one story because of open elevator shafts (8), open stairwells (6), unprotected conveyor openings (3) and nonfirestopped walls (2).

Substandard Storage Methods

Three fires in which improper storage methods were responsible for unsatisfactory sprinkler performance have been cited. There were 23 other fires where substandard storage methods were among the factors responsible for the extent of damage. Inadequate subdivision of stock (15 instances) and stock piled too high (6 instances) were the most frequent examples.

Cotton Storage

Jan. 6, Fort Worth, Texas, Northwestern Compress Co. $747,000

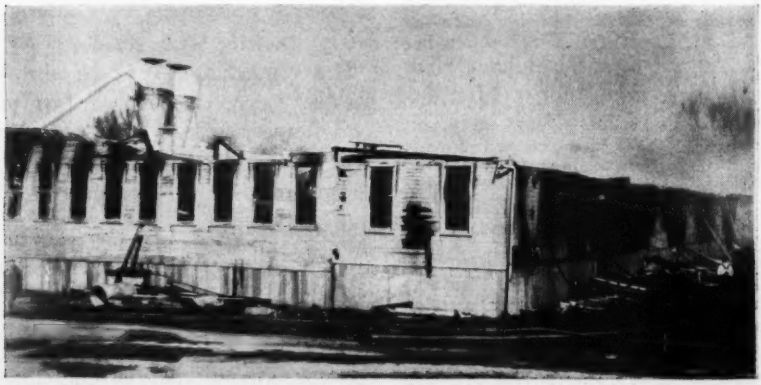
4,860 bales of cotton. While on his 6:30 P. M. half hourly round the watchman opened the fire door between compartments No. 3 and No. 4 and discovered fire at one end of No. 4. As he ran to give the alarm fire apparatus arrived in answer to a previously sent outsider's alarm.

The 55,000 sq. ft. compartment No. 4 was destroyed but the combined action of a fire wall with protected openings, fire department hose streams and a favorable wind kept flames from other compartments in the unsprinklered wood-framed, metalclad warehouse.

It is thought that tramps who frequented the neighborhood may have accidentally started the fire while in the accessible 6-ft.-high space beneath the floor. An accumulation of cotton that had dropped through floor cracks was in this subfloor area.

Oct. 8, Leachville, Ark., Buffalo Island Compress Co. $900,000

5000 cotton bales. While employees were using a lift truck to break out bales for shipment, an unprotected 75-watt lamp on an



Salem Democrat

Sprinkler protection was not extended to an addition to this building materials warehouse at Salem, Ind. On March 23 fire started in the addition and spread through unprotected doorways to the main warehouse where all sprinklers fused, overtaxing the single source water supply. Loss was $400,000.

Kansas City Fire Department

The elderly custodian-watchman at this building supplies warehouse at Kansas City, Kan. was taking a nap during the night of September 15 when fire apparatus arrived at the building in answer to an outsider's alarm.

extension cord was either struck or fell and broke. Fire broke out in a bale and before standpipe hoses could be placed in operation had started to spread to adjoining bales in the pile of origin in the congested 32,000 sq. ft. compartment.

Bales were stacked in rows three to four bales high, two bales wide and 85 feet long. Five foot cross aisles between rows of bales that normally would have confined the fire to the row of origin were ineffective due to bales temporarily stored in the aisles. It was 1½ minutes to 2 minutes before the first sprinklers on the dry pipe system operated and with no draft curtains to confine the heated air the fire opened a large number of sprinklers. Reports are not conclusive as to whether sprinklers were holding the fire in check when firemen arrived. First arriving firemen did say that the building was filled with smoke but no flames were visible. Within 20 minutes, however, after they had connected pumpers to yard hydrants, the roof collapsed. This would seem to indicate that the yard-hydrant-connected pumpers reduced the residual pressure to such an extent that there was not enough water to supply sprinklers. There was no pumper connection on the sprinkler system. The fire department connection to the looped yard mains was not used.

The primary water supply for sprinklers and yard hydrants was a dead-end 6-in. main supplied by the city. The secondary supply was a 100-ft.-high 100,000-gal. gravity tank which went dry in about an hour.

The compartment and 5000 bales of cotton were destroyed, but a fire wall with openings protected by double fire doors and with wings at either end saved spread to an adjoining compartment.

Cotton Storage

*Oct. 8, Gainesville, Texas, Agricultural Enterprises, Inc. $1,154,000

7,086 bales in three warehouses. Summoned by neighbors at 11:05 A.M. firemen found an unsprinklered 8,115 sq. ft. brick, wood-joisted warehouse containing 346 bales of cotton in flames. During the destruction of this building heat penetrated the masonry wall of a second warehouse 12 ft. away. Five bales of cotton piled against the wall in the exposed warehouse were ignited. Sprinklers controlled this fire and at 1:30 P.M., after the five involved bales and eight others had been taken outside, the sprinkler system was shut off and fire apparatus was returned to quarters.

*Fire spread to other buildings.

Gainesville Daily Register

Sprinklers were shut off when fire broke out in this cotton warehouse at Gainesville, Texas, on October 8. (See report starting on page 295.)

At 2:55 A.M. the next morning, the five volunteer firemen who had been left on the scene to wet down the destroyed unsprinklered warehouse saw fire suddenly envelop the interior of the exposed warehouse where sprinklers had been shut off. By the time the fire department was again on the scene the building and its contents of 4,800 bales were beyond saving and heat and embers had ignited the wooden walls and roof of a third warehouse 49 ft. away.

Sprinkler protection in this third warehouse may have been turned off at the same time the system in the second warehouse was shut off. Even if the system were on, however, the protection might have been overpowered by the severe exposure fire.

Nov. 30, Gurdon, Ark., Minton Cotton Warehouse. $595,000

3,411 bales of cotton. On October 30, an inspector had inspected this sprinklered 19,200 sq. ft. metalclad warehouse and had reported that the sprinkler protection was impaired by overloading of the warehouse with bales stored in excessively high piles and stored in aisles and cross aisles. Fire one month later confirmed his conclusion.

The capacity of the building was 1,280 bales stored 1-high, whereas on November 30 there were 3,411 bales in the building. While all employees were temporarily out of the building, smoke was seen coming from the open loading doorway. When firemen arrived fire already had complete control of the interior of the building and was so intense that two yard hydrants could not be used and it was impossible to connect the fire department connection to the sprinkler system located beside the loading doorway.

Witnesses stated that sprinklers were operating early in the fire. Failure of sprinklers to control the fire can be attributed to improper storage methods which resulted in the rapid fire spread.

*Fire spread to other buildings.

Electrical Equipment Warehouses

*Jan. 7, Covington, Ky., W. W. Welch Co. et al. $1,088,000†

Electric fans and parts. What has been described as an impossible situation for a

†Figure includes business interruption loss.

fire department confronted Covington firemen responding to an alarm transmitted by cruising police at 5:39 A.M. The fire was in a 290 ft. by 246 ft. former loose leaf tobacco sales building recently converted to storage and assembly of electric fans and loaded with cardboard cartons of fans and parts. No watchman or automatic protection was provided.

The undivided and unsprinklered 1-story brick, steel-framed building was totally involved when the first alarm was sounded and a wall collapsed five minutes later. By posting men on and in surrounding buildings, the Covington and mutual aid fire departments confined damage in exposures for the most part to burned window frames and broken glass. A sprinklered 1-story exposure was badly damage when a falling wall fell through the roof. Since sprinkler piping was broken, sprinkler valves were shut and the ensuing fire was fought with hose streams.

May 7, Lemoyne, Pa., Ott Distributers, Inc. $500,000

Household electrical appliances. Lightning was the probable cause of fire that destroyed this unsprinklered U-shaped 1-story masonry, wood-joisted building. The fire was discovered by a milkman at 1:36 A.M., 2½ hours after the storm. During this time it is believed to have developed above the suspended ceiling before breaking into the open and involving the large concentration of stock in combustible containers. Half of the 22,000 sq. ft. building was in flames when firemen arrived.

One leg of the U-shaped building had recently been added. A masonry wall had been erected at the junction of the old and new sections but a 10 ft. by 10 ft. opening in this wall had been left unprotected. The fire spread through this opening to the rest of the building.

May 22, Kansas City, Mo., McGee Radio Corp., et al. $808,000

Radio parts; grass, alfalfa seeds. Lightning is believed to have struck the roof of this 11,500 sq. ft. 5-story brick, wood-joisted building at about 7:00 P. M., three hours before a policeman noticed smoke coming from the top of the building. Firemen found the top story in flames and because of the lack of window openings (building had formerly been an ice house) and absence of a continuous enclosed stairway were unable to get water on the fire until the roof collapsed. Floors collapsed later as the fire burned out of range of hose streams. In addition to the combustible contents, floors and roof construction, combustible wall and roof insulation of the former ice house contributed fuel for the fire. The building had no watchman or automatic protection.

Food and Grocery Warehouse

Oct. 21, Detroit, Mich., National Food Stores, et al. $1,065,000

Grocery store warehouse; steel tank fabricating. The 43,000 sq. ft. section of this 68,000 sq. ft. building occupied for dry

The Greeneville Sun

This undivided 4-acre warehouse was unsprinklered and was located outside the city of Greeneville, Tenn. where there was no public fire protection. Fire destroyed the warehouse on October 1.

Van Ness Photos, Inc.

Fire was beyond control in the second story of this Jersey City, N. J. food products warehouse when discovered by outsiders on May 9.

grocery storage was destroyed by fire that broke out at an electric panelboard on Sunday morning. A 12-in.-thick concrete block wall backed up by fire department hose streams kept fire out of the adjoining 25,000 sq. ft. section occupied by the tank fabricator.

Poor stockpiling was one of several fire protection weaknesses responsible for the total loss in the grocery section. Groceries were piled 16 to 20 ft. high with narrow aisleways with particularly narrow wall aisles. In fact, the watchman stated that it was hazardous to patrol close to the wall because of the narrow aisles and the leaning piles of stock. Other substandard fire protection features were lack of supervision of the watchman, failure to subdivide the large grocery storage area into several smaller areas by fire walls, absence of sprinklers.

The watchman saw smoke at ceiling level at about 8:30 A.M. and after determining that it was not coming from the coal furnace telephoned the fire department. As he was giving the alarm he saw flames on top of a pile of shopping bags adjacent to the electric panelboard.

Firemen got hose lines into the congested building but were severely hampered by the congested high piles several of which toppled over, injuring one fireman seriously. Using 25 2½-in. hose lines, some of which fed deluge guns and ladder pipes, fire fighters had the fire under control by 11:45 A.M.

Grain Elevators

*March 28, Philadelphia, Pa., Tidewater Grain Co. $2,593,000; 3 killed

Terminal grain elevator. Two dust explosions within seconds of each other practically demolished a group of six interconnected 3- and 4-story buildings of mixed construction occupying a 100 ft. by 225 ft. area in a built-up section of the city. Three persons were killed, approximately 100 were

*Fire spread to other buildings.

United Press

Terminal Grain Elevator, Philadelphia, Pa.

injured and buildings up to three and four blocks away in all directions suffered heavy explosion damage.

An intense and deep-seated fire in the rubble of the grain elevator still required the use of 16 hose streams three days after the explosion. Fires that broke out in two adjacent fire-resistive buildings did not cause extensive damage and in these exposures and in the others within a radius of 500 ft. explosion damage in the form of blown-out windows, fallen ceilings, wrecked partitions and damaged water and steam pipes was heavy.

Cause of the explosion could not be definitely determined. At the time corn was being transferred by a long and involved conveyor system to a truck. The dust cloud created by this operation could have been exploded by any one of several ignition sources: hot bearing, broken bucket conveyor belt, direct gas-fired grain drier, overheated elevator motor, static discharge. The second more violent explosion probably involved dust on structural members thrown into suspension in the large undivided building by the first explosion.

April 28, near England, Ark., England Drier and Elevator Co., Inc. $625,500

Rice drier and elevator. At 1:45 A.M. a passing motorist saw fire in one of the drier sections, drove into town and gave the alarm. The volunteer department responded but had to return to town and approach the fire via another road in order to locate their pumper at a drainage ditch, the only water supply available. This maneuver required 15 minutes after which there was a further delay of 45 minutes in getting water on the fire due to faulty mechanical operation or improper operation of the exhaust priming mechanism.

The fire was confined to the roof of the low 1-story drier section when apparatus first arrived but by the time water was at the nozzles flames had extended up through adjoining elevators to wooden storage bins on top of two banks of 60-ft.-high concrete storage tanks. Approximately 275,000 bushels of rice were in the bins and tanks when the fire occurred.

Hardware

March 16, near Charlotte, N. C., J. I. Case Tractor Co. $750,000

Tractors, farm equipment. At 6:55 P.M., 55 minutes after the last employee had left the 200 ft. by 150 ft. 1-story brick, wood-joisted building, smoke was seen coming from the building by a passerby. By the time volunteer firemen were on the scene flames were coming from the roof above the shipping department. Since the only water for fire fighting had to be carried to the fire in tank trucks, firemen could do little to check the spread of wind-driven flames through the undivided and unsprinklered building.

On the afternoon prior to the fire, employees had been dipping tractor parts in paint and had laid them out on the floor of the shipping department to dry. Excelsior and other packing materials were in the shipping department.

Machinery Warehouse

*Feb. 15, Des Moines, Iowa, John Deere Plow Co. $1,178,000; 2 killed

Farm machinery, wholesale household appliances. Fire discovered by a passerby at 10:52 P.M. was so far advanced when fire-

*Fire spread to other buildings.

men arrived that they were unable to enter the undivided and unsprinklered 4-story farm machinery warehouse. Exterior walls were brick, floors and roof were wood and joists were wood supported by heavy timber supports on 18 ft. centers.

Fire fighters were doing their best to confine the fire to the building of origin when one of the 12-in.-thick exterior walls fell on the roof of an adjoining 1-story building killing two firemen. Thereafter the fire spread through the 1-story building.

Miscellaneous Storage

June 8, Evansville, Ind., Bernardine Bottle Cap Co., et al. $835,500

Bottle cap supplies, cartons. The 70 ft. by 350 ft. unsprinklered 1-story brick, steel-framed building loaded with cartons, cork, plastic sheets, tin plate, and paper, was destroyed by fire discovered by a passerby an hour after employees locked up the warehouse and went home. Careless smoking by one of the employees was a possible cause.

Fire was kept from an adjoining sprinklered warehouse of similar construction by an 8-in.-thick brick fire wall, with double fire doors at openings. Considerable water damage occurred in the exposure, however, when the parapet of the fire wall fell on the roof and broke a sprinkler pipe.

Sept. 25, Dallas, Texas, New York Merchandise Co., Inc. $750,000

Imported novelties and variety store merchandise. Fire that heavily damaged this 189 ft. by 95 ft. 1-story noncombustible building (masonry walls, unprotected steel framing, metal roof deck) is another example of the fallacy of storing combustible contents in a noncombustible building without sprinkler protection.

The fire had been burning for about 30 minutes before discovery by a passerby. Firemen found fire coming from a crack at the junction of the roof and one wall and on opening the building saw fire burning on the surface of stock that was piled throughout the undivided building, including the main aisle and the areas inside the large loading doors.

Two holes were made in the roof with great difficulty and cellar nozzles were directed through these holes. They were not very effective and the fire was finally extinguished by clearing doorways and aisles and advancing spray nozzle-equipped hoses into the building.

*Sept. 29, near Greenville, N. C., New Enterprise Warehouse, et al. $807,000

Tobacco sales building used for storage of agricultural equipment, corn, wheat, oats and hogsheads of tobacco. The first of three suspicious fires in warehouses in and near Greenville had broken through the roof before discovery by a patient in a nearby hospital at 2:56 A.M. Why the watchman for this 191,000 sq. ft. 1-story masonry, wood-joisted building did not discover the fire when still small has not been explained. When he opened the door of the office in the front to investigate a noise in the rear heat was so intense that he was forced outside.

First arriving firemen found fire coming from the rear quarter of the roof and most of the interior of the undivided and unsprinklered building in flames. Using two 2½-in. hoses supplied from the nearest hydrant 800 ft. away, Greenville firemen concentrated on saving a metalclad warehouse 40 ft. from the burning building. Fire in the exposure caused $12,000 damage.

*Fire spread to other buildings.

Courier-Journal and Louisville Times

The value of fire doors was demonstrated by this fire at a Louisville, Ky. multiple occupancy warehouse. **(See story on page 301.)**

Multiple Occupancy Storage

March 31, Louisville, Ky., Dixie Warehouse and Cartage Co., et al. $500,000

Warehouse space rented to various companies. Originating on the rear loading platform, apparently in cartons and other rubbish, fire involved the loading platform and communicating 1-story wooden loading area and had burned through a large wooden door to the interior of an unsprinklered 4-story brick, wood-joisted warehouse before discovery by an outsider at 4:08 P.M. That the fire was not discovered earlier is explained by the fact that the fire occurred on a Saturday afternoon and watchman protection was provided for nights only. On entering the 4-story warehouse fire rapidly involved the interior and broke through the roof due to the interior construction which consisted of a central open space extending to the roof and running the length of the building with storage galleries on either side.

The fire presented an excellent example of the value of standard protection for openings in fire walls. Two adjoining warehouses communicated with the loading platform and loading area where the fire started. As indicated, the fire entered one of these buildings through a large wooden door. Standard fire doors protected the openings in the brick wall between the loading area and the other exposed warehouses. Although both warehouses were subjected to the same exposure, fire did not enter the one protected by standard fire doors.

June 23, Kearny, N. J., Kearny Terminal Corp., et al. $1,540,000

Various tenants stored combustible materials including polystyrene plastic granules in paper bags (1,200,000 pounds), engine and cosmetic oils, weed killer, cartons, animal feed. Shortly after a lightning storm an outsider discovered fire coming from this 100 ft. by 300 ft. undivided and unsprinklered 1-story brick, steel-framed building. Because of the large amount of combustible contents high piled and without adequate aisle separation the fire spread rapidly throughout the contents and had involved most of the under surface of the wood roof deck when apparatus arrived.

The fire originated in the vicinity of stored animal feed which, on being tested, was found not be susceptible to spontaneous heating but which, once ignited, burned intensely.

United Press

Fire in Chicago, Illinois, September 27. (See story below.)

Paper Warehouse

Sept. 27, Chicago, Ill., C. Attwood and L. Niedlman. $500,000

Waste paper. Firemen responding to an outsider's alarm at 6:25 A.M. found fire beyond control on all floors of this 135 ft. by 250 ft. 3-story brick, wood-joisted building. The building was one of Chicago's oldest and was originally occupied by the Wells-Fargo Express Company. Horse ramps between floors had never been closed and provided means for the fire to spread from the first floor to upper stories. No watchman or automatic fire protection was provided.

Scrap Metal, Paper, Rags

Dec. 5, Rockford, Ill., Joseph Behr and Sons, Inc. $500,000

Scrap metal, paper, rags. While this plan was closed for the night fire broke out in 80

Wide World

The thirty truck trailers left backed to the loading platform at this Dallas, Texas truck terminal prevented firemen from directing hose streams through loading doors. (See story below.)

pounds of magnesium cuttings stored in waterproof bags in a slightly detached unsprinklered former lumber drying kiln. The kiln was of fire-resistive construction but the former loading door openings were closed with wooden doors.

The fire in the magnesium destroyed the doors and radiated heat penetrated the brick veneer wall of the sprinklered main 4-story building across a small courtyard from the former kiln. Fire broke out within the walls of the exposed building and spread out of range of sprinklers, finally breaking out over such a large part of the building that sprinklers were overpowered.

The dry pipe system in the building was supplied by a 6-in. connection to an 8-in. circulating city main. Two fire department connections were accessible and had the fire department pumped into these it is thought probable that sprinklers would have been able to control the fire in the 4-story exposure.

An alarm was telephoned by an outsider at 8:13 P.M. and was followed immediately thereafter by a water flow alarm transmitted by the central-station-supervised sprinkler system in the 4-story exposure. Intense white flames were issuing from the metal storage kiln and fire was already spreading within walls of the 4-story exposure. Fire fighters tried to enter this building but were driven out by the smoke. Apparently the fire had not broken out into the open at this time although reports are not clear on this point. Reports agree however, that fire department connections to the sprinkler system were not used, and as indicated above, investigators believe that this was a serious oversight.

Terminal Warehouse

Dec. 25, Dallas, Texas Yellow Transit Co., et al. $1,950,000

Truck freight terminal, 30 truck trailers. This disastrous fire is another example of the fallacy of placing the protection of high values in the hands of an elderly, untrained and unsupervised watchman. The building consisted of a 205 ft. by 70 ft. 1-story brick, steel-framed freight section with loading docks along the two long sides. Adjoining and at right angles to one end of the freight section was a 100 ft. by 40 ft. 2-story office and dormitory section. A parapeted masonry wall separated the two sections.

Neither section was sprinklered. Thirty truck trailers, most of them loaded, were backed up to the loading doors, some open, along the two sides of the freight section.

Sometime after 6:00 A.M. the watchman was sitting in the office section drinking coffee when he heard a noise and on investigation found the freight section on fire. He returned to the office, then went to his car and drove to a tourist court to telephone the alarm. He was informed that a passerby had already notified the fire department. Men on the first responding apparatus saw smoke and flames while still a mile from the terminal. Less than 10 minutes after their arrival the roof and part of one wall collapsed.

Hose streams were used primarily to prevent the fire from getting beyond the fire wall to the office section. Efforts to attack the fire in the storage section in the early stages when hose streams might have had some effect on the outcome were severely hampered by the manner in which all doorways were blocked by the parked truck trailers.

Textile Warehouse

July 17, Columbus, Ga., Reeves Brothers, Inc. $556,500†

Cotton mill warehouse for raw and finished material. On discovering fire in roving storage in the fifth story of the sprinklered 5-story brick, plank-on-timber building employees tried to control it with extinguishers but the fire continued to develop until six sprinklers fused and brought it under control. Assuming that the fire was out, the employees closed the sprinkler valve, whereupon the fire blazed up again. The sprinkler valve was reopened but the fire had spread in the meantime to such an extent that 63 sprinklers fused. Firemen, who were called when the fire blazed up, used two 2½-in. hoses to complete extinguishment.

Water damage to finished stock on lower stories accounted for most of the loss. Three days later, while employees were removing damaged stock and equipment, a 1½-in. branch sprinkler pipe was accidently struck by equipment being lowered from the attic to the fifth story through a trap door, causing more damage.

†Figure includes business interruption loss.

Tobacco Warehouse

Dec. 1, near South Carthage, Tenn., Tennessee Loose Leaf Tobacco Warehouse Co. $506,000

The 1-story steel-framed, metalclad tobacco sales and prizing building destroyed in this fire contained a single fire area of 59,000 sq. ft. in the first story and had no watchman or automatic fire protection. At 2:30 A.M., 8½ hours after prizing for the day had been completed, a passerby discovered fire that apparently originated in a prizing room in the basement and had spread to most of the undivided building and its contents of tobacco in baskets. With no water available for firemen who responded from South Carthage they were unable to keep the fire from spreading to and destroying five railroad cars loaded with hogsheads of tobacco. Some 600,000 lbs. of tobacco were destroyed.

Toiletries Warehouse

Nov. 22, Jeffersonville, Ind., Colgate-Palmolive Co., et al. $555,500

Vasoline in jars, hair tonic in bottles, boxes of soap powder all in cardboard cartons. This fire is another demonstration of the fact that sprinklers cannot be expected to control a fire in its early stages if poor stock-piling prevents effective discharge of water on the fire. The cardboard cartons were piled on wooden pallets (height of piles not reported) with practically no aisle space left in the 1-story wooden building. The building was protected by three single source dry pipe sprinkler systems supplied by a 100,000-gallon gravity tank (in turn supplied by pumps from a reservoir).

No one knows just where this fire broke out but at 12:21 P.M. when the watchman in his office in another building heard the sprinkler alarm and looked out, black smoke was pouring from the building. Firemen who were called at once found two-thirds of the building in flames. It was obvious that the sprinklers were not holding the fire but this would hardly seem to be sufficient reason not to pump into the sprinkler system which still offered the best means of getting water into the fire area. Instead, firemen fought the fire exclusively with hose streams. Once the fire broke through the roof, heat driven by a 20 mph wind made it necessary to protect the roofs of buildings 250 ft. from the fire.

Kearney Hub Publishing Co.

This former military hangar at Kearney, Nebr. was being used for wheat and soybean storage when fire broke out on November 9. Poor water supplies handicapped firemen.

Warehouse Fires with Losses from $250,000-$500,000

Building Materials Warehouses

March 23, Salem, Ind., Smith Cabinet Mfg. Co., Inc. $400,000 *(Photo, page 294)*

Aug. 28, Kansas City, Kan., Owens-Corning Fiberglas Corp. $383,000

Sept. 15, Kansas City, Kans., Roddis Lumber and Veneer Co., Inc. $443,000 *(Photo, page 295)*

*Dec. 2, Quakertown, Pa., Quakertown Coal and Lumber Co. $250,000

Corn Cob Pile

Dec. 2, Memphis, Tenn., Quaker Oats Co. $450,000

Cotton Storage

Feb. 24, Chattanooga, Tenn., Southern Chemical Cotton Co. $365,000

*March 27, Dillon, S. C., South Carolina State Warehouse No. 3462. $358,000

*Aug. 21, North Little Rock, Ark., Southern Compress Co., et al. $350,500†

Cottonseed Warehouse

Oct. 30, Yazoo City, Miss., Mississippi Cottonseed Products Co. $283,500

Electrical Equipment Warehouses

*May 7, Wichita, Kan., O. A. Sutton Corp., et al. $474,500

Oct. 1, near Greeneville, Tenn., Four-Acre Co-op Warehouse. $378,500 *(Photo, page 297)*

Nov. 24, Chicago, Ill., Ira L. Larkin Co., et al. $275,000

Food and Groceries Warehouses

*April 29, Roanoke, Va., A. Meier Brokerage Co., et al. $312,500

May 9, Jersey City, N. J., G. I. Wholesale Grocers. $272,000† *(Photo, page 298)*

Furniture Warehouses

*May 18, Vernon, Calif., Hadley Furniture Co., et al. $250,000

Sept. 6, Youngsville, Pa., Eichenlaub's Furniture Co. $275,000

Sept. 19, Chester, Pa., Jerry Hampton Furniture Co., et al. $250,000

Grain Elevators

*Oct. 7, Britton, Mich., J. J. Walper and Son. $251,000

Oct. 9, Port Arthur, Ont., Canadian National Railways. $250,000

Nov. 9, Kearney, Nebr., Ingalls Grain Co. $250,000

Machinery Warehouses

Jan. 20, Congaree Air Force Base, S. C. United States Government. $250,000

Feb. 13, New York (Richmond), N. Y., William S. Archer. $300,000

Miscellaneous Storage

Feb. 13, Houston, Texas, Ada Oil Co., et al. $475,500

March 12, Nashville, Tenn., General Shoe Corp. $300,000

April 20, Ajax, Ont., E. F. Drew and Co., Ltd. $260,000

Dec. 10, Winnipeg, Man., Western Smallwares and Stationery Co., Ltd. $250,000

Tobacco Warehouse

Dec. 17, Reidsville, N. C., Smothers Warehouse. $300,000

*Fire spread to other buildin· ·

†Figure includes business interruption loss.

24 Large Loss Residential & Institutional Fires

The 24 large loss fires in residential-type occupancies in 1956 far exceeded the number of such fires in any previous year. Five apartments, four dormitories, three dwellings, two hospitals, eight hotels, one motel and one orphanage made up the group. There were eleven fatalities involving buildings occupants (five in two hotel fires, four in one dormitory fire, two in the Valleyfield, Que. conflagration), and 49 injuries (29 to fire fighters, 20 to building occupants). Total loss from these 24 fires was $11,765,000.

Unlike the experience in other than residential occupancies, most of the buildings in which these fires started were occupied at the time (22) and a large majority of the fires (18) were discovered by a building occupant. Yet in only one case was detection reasonably prompt. Thus, the presence of people in a residential building will not guarantee prompt detection and some other means, such as standard watchman protection, standard automatic fire alarms or standard automatic sprinkler systems must be provided if there is to be reasonable assurance of prompt fire discovery.

None of the 24 buildings were protected by an automatic fire alarm system, only one had watchman protection, two had partial sprinkler systems and one had a complete sprinkler system.

The one watchman (dormitory, Fulton, Mo.) did not discover the fire promptly because his tour of the campus buildings brought him to the dormitory only once every two hours. Fortunately, the housemothers discovered the fire in time for the 128 students to escape through open stairs and corridors, rapidly filling with smoke, before they became impassable.

The two partial sprinkler systems (orphanage, Buffalo, N. Y.; apartment, Lynn, Mass.) were of no value since the fires did not originate in or spread to the areas protected by sprinklers.

Sprinklers were installed throughout the dormitory destroyed by fire at Berthierville, Que., but the sprinkler protection was grossly substandard due to the poor water supplies and was therefore unable to control the fire.

Principal structural weaknesses influencing fire spread in the 24 fires were open stairwells (11), nonfirestopped walls or ceilings (9), undivided attics (8) and open elevator shafts (7).

Apartments

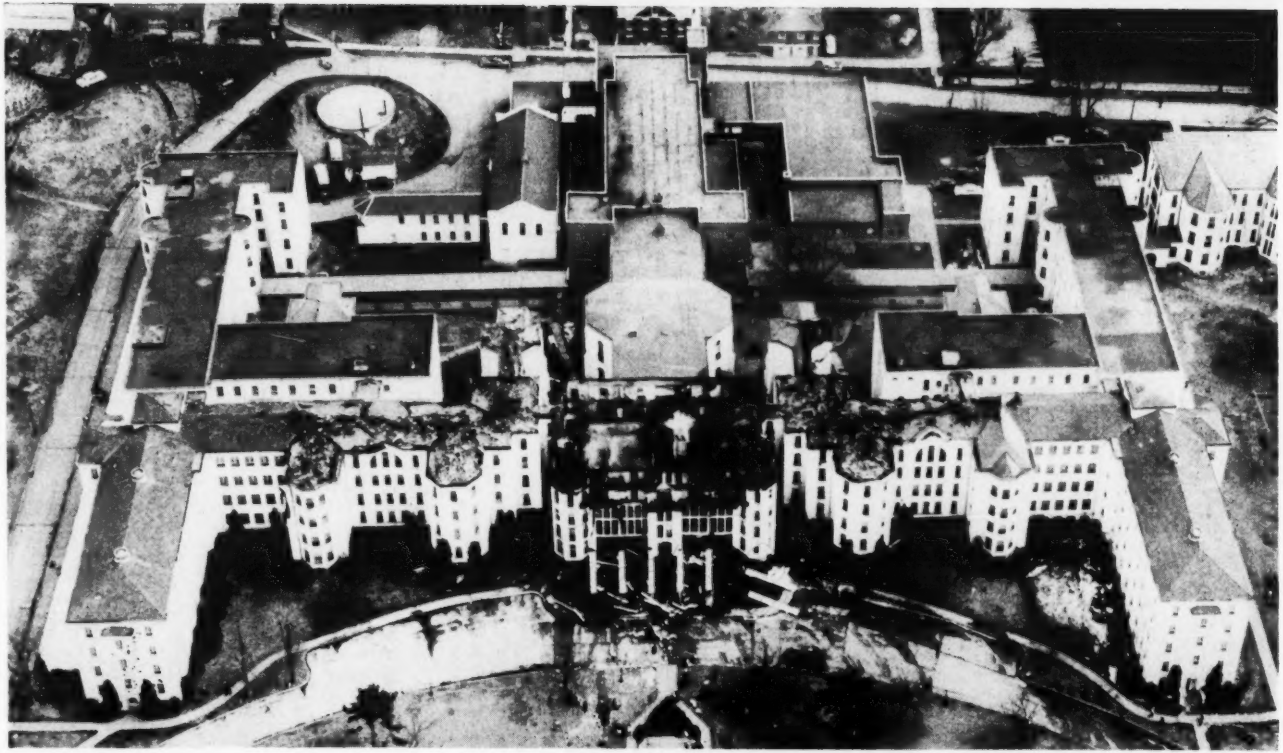
Jan. 23, Newport News, Va., A. Becaurakis, et al. $624,000

Apartments, lodge hall, stores. At 1:06 A.M. occupants of a building across the street saw flames coming from lodge hall windows in the second story of the unsprinklered 2-story brick, steel-framed building. Two and a half hours later, when firemen had the fire in the lodge hall almost under control, a natural gas explosion occurred, after which the fire could not be controlled until the building was practically destroyed. The gas is thought to have leaked into the building from pipes broken in the fire.

*Dec. 30, Valleyfield, Que., Conflagration, $500,000; 2 Killed

15 buildings housing 32 families, 8 stores. Fire that originated in a grocery store on the first floor of a 3-story wooden building with eight apartments on upper floors was out of control when an occupant of an upstairs apartment was awakened by smoke at 5:15 A.M. Eight hours later, when the fire was finally stopped 15 wooden buildings in a 2-block area were destroyed. Fifteen to twenty-five mph winds, below zero temperature and the congestion and combustibility of the buildings prevented firemen from checking the fire earlier. A shift in the wind

*Fire spread to other buildings.



Missouri Inspection Bureau

Six weeks after an emergency evacuation plan had been put into effect at this Fulton, Mo. hospital, attendants were required to carry out the plan. The fire, occurring on March 14, originated in the basement of the administration building, spread up an elevator shaft to the attic and spread laterally through the attic to the attics of two communicating ward wings. The 720 mental patients in the wings were safely evacuated according to plan. (See report starting on opposite page.)

Daily Evening Item

The partial sprinkler system for this Lynn, Mass. apartment building was not installed in the attic where the fire originated on May 25, and a $429,000 loss resulted.

direction was given as the principal reason that there was not more widespread destruction. Two occupants of dwellings were unaccounted for after the fire.

Dormitories

March 11, Stockbridge, Mass., Shadowbrook Novitiate. $1,000,000; 4 killed

100-room mansion converted to seminary living and teaching facilities. Four priests lost their lives in fire that destroyed this rambling 3-story stone, wood-joisted building. Most of the remainder of the 131 faculty and students asleep in dormitories in upper floors escaped down fire escapes, jumped, or were rescued by fire companies.

The extent of the fire on discovery prevented definite conclusions as to the cause and point of origin. Occupants on upper floors on being awakened shortly before 1:00 A.M. found fire coming up the stairway and the elevator shaft near the center of the building. Both of these shafts were enclosed but no one seems to know whether the doors on the shafts were closed.

The most significant feature of the fire, in the opinion of the fire chief, was the absence of a watchman or automatic fire protection.

Hospitals

*March 14, Fulton, Mo., Missouri State Hospital No. 1. $2,500,000

Mental hospital. Six weeks before fire destroyed the Administration Building and the roof of two ward wings the hospital administration had changed and steps had been taken to comply with some of the

*Fire spread to other buildings.

United Press

When fire was discovered in the Squaw Valley, Calif. resort hotel on August 29, it had made so much progress that hotel employees could not check it with extinguishers and standpipe hoses.

recommendations made repeatedly by the Missouri Inspection Bureau under its statewide hospital inspection program. A fire brigade had been organized and two staff meetings had been held to arrange a plan of emergency evacuation of the patients. This preplanning saved lives on March 14.

The fire originated at elevator controls in the basement of the unsprinklered 4-story brick, wood-joisted Administration Building and was discovered by the switchboard operator on the first floor at 11:15 P.M. (Earlier in the evening smoke had been smelled but no fire could be found so nothing further had been done.) The fire spread up the elevator shaft and had involved the upper two stories of the practically unoccupied building when the fire brigade and public fire department arrived. As fire spread to the attics and roofs of two com-

(Continued on page 310)

Tarrytown Daily News

This 42-room mansion at Tarrytown, N. Y. was closed for the winter on March 6, when fire broke out (see report, page 310).

Wide World

Four of the 131 sleeping occupants of this seminary dormitory at Stockbridge, Mass. lost their lives when fire destroyed the 3-story stone, wood-joisted building on March 11. Absence of automatic protection allowed the fire to spread up stair and elevator shafts before discovery. **(See report, page 307.)**

Wide World

Poor water supplies, open stairways and lack of sprinklers contributed to the destruction of this girls' dormitory at Fulton, Mo. on Nov. 12. After spreading through the 1- and 4-story brick, wood-joisted section, fire extended to an adjoining 4-story fire-resistive building by means of a continuous wood cornice, and by means of plain glass windows overlooking the 1-story section of the building of origin.

municating unsprinklered 4-story brick, wood-joisted ward wings evacuation of 720 patients according to the prearranged plan was carried out satisfactorily.

Concrete fourth story ceilings installed in the wings several years after their construction as part of an over-all effort to reduce the combustibility of the wings were major factors in preventing the fire from dropping below the attics. Spread to two other ward buildings via adjoining attics was prevented by masonry walls extending to the roof.

Hotel

April 25, Warren, Pa., Carver Hotel Corp. $500,000; 4 killed

102-room hotel. Four of the 13 guests on the top floor of the 4-story brick, wood-joisted hotel lost their lives because the hotel owners had not provided adequate fire protection for their guests. Among the fire protection weaknesses responsible for the deaths were lack of sprinklers, automatic fire detection and a building fire alarm system, and the presence of open stairways.

The fire apparently originated in a fourth story closet and had burned through the closet door and into the hallway before a guest in an adjacent room heard a noise at 1:40 A.M. and opened his door. He managed to run the length of the 180-ft. hallway and back pounding on doors and yelling "Fire!" before flames started to spread beneath the ceiling and forced him to flee down an open stairway. Nine top story guests escaped down open stairways, an outside fire escape or painters' scaffold ropes but the four who did not try to escape at once were trapped. The entire top story was in flames when fire fighters arrived.

Private Residence

March 6, Tarrytown, N. Y., Mary Duke Biddle. $664,500

42-room mansion. If a small part of the money that had been lavished on the construction and furnishings of this huge 3-story stone, wood-joisted building had been allotted to fire prevention, the building would probably be standing today. Fire broke out in the basement while the building was closed for the winter and was not discovered until smoke was noticed by neighbors a quarter mile away at 10:23 P.M. Firemen found the tightly closed building heavily charged with smoke and hot fire gases and consequently were not able to get inside to make effective use of their limited water supplies. Flames spread up open stairways and elevator shafts and had broken through the roof by midnight.

Residential and Institutional Fires with Losses from $250,000-$500,000

Apartment Buildings

April 24, Tulsa, Okla., Longfellow Apartment Building. $300,000

*May 21, Passaic, N. J., Annette Kwarthler, et al. $365,000

May 25, Lynn, Mass., The Breakers Apartments. $429,000 (*Photo, page 307*)

Dormitories

March 31, Cincinnati, Ohio, St. Gregory Seminary. $337,000

Sept. 11, Berthierville, Que., St. Joseph's High School. $300,000

Nov. 12, Fulton, Mo., William Woods College. $475,500 (*Photo, page 309*)

Dwellings

June 13, Bearden, Tenn., Mrs. Benjamin I. Harrison. $250,000

Aug. 21, near Colusa, Calif., Terrill Sartain. $299,000

Hospitals

May 6, Lakeland, N. J., Camden County Mental Hospital. $250,000

Hotels

*Jan. 31, Marion, Ind., New Marion Hotel. $406,000

Feb. 29, Kitchener, Ont., Windsor Hotel. $261,500

May 4, Long Beach, N. Y., Adelon Hotel. $250,000

*May 18, Fallsburg, N. Y., Hotel Nemerson. $400,000

Aug. 20, Marysville, Calif., Western Hotel, et al. $323,500; 1 killed

Aug. 29, Squaw Valley, Calif., Squaw Valley Lodge. $306,000 (*Photo, page 308*)

*Sept. 9, Cornwall, Ont., Royal Hotel, et al. $269,500

Motel

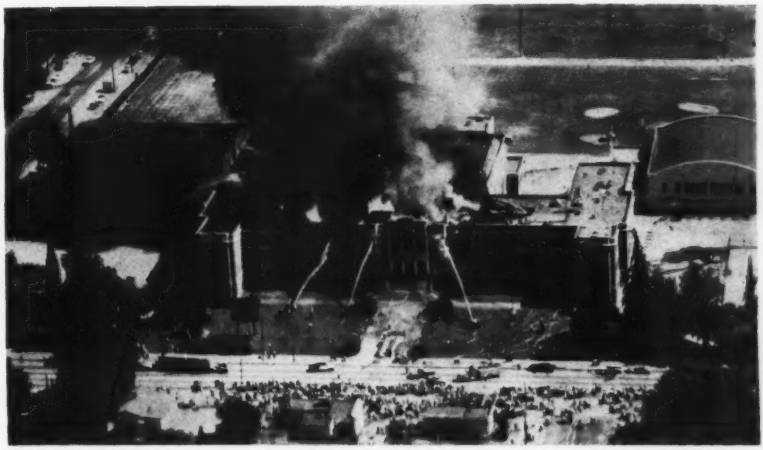
April 16, near Destin, Fla., Shoreline Hotel. $350,000

Orphanage

Jan. 7, Buffalo, N. Y., German Roman Catholic Orphan Home. $404,500

*Fire spread to other buildings.

Twenty-one Large Loss School Fires



Robert C. Frampton

Fire at this Pomona, Calif. high school on May 14 provided another example of the importance of fire drills. There was no panic or confusion as the 1,385 students and 56 teachers evacuated the building safely in two minutes.

Reflecting the 1956 large loss fire experience of most other occupancies schools also showed a big increase in the number of such fires in 1956 over 1955, — 21 in 1956 as compared with 10 in 1955. These 21 fires caused $9,033,500 loss.

Eighteen involved primary and secondary schools, the other three were in colleges. A striking feature of the 18 fires in primary and secondary schools was that six were discovered while the schools were in session. The safe evacuation of occupants without a single injury is attributed to the effectiveness of the fire exit drills at these schools.

Despite the fact that six fires occurred while classes were in session none of the 21 fires were discovered promptly, evidence that automatic fire protection is necessary for prompt discovery and control of fires even when buildings are occupied. None of the schools had a central-station or fire-department-connected automatic fire alarm system and the three that had watchman protection were on college campuses where the tours of the campus watchman were so long or infrequent that fires were able to originate and spread beyond control between tours.

None of the buildings had a complete sprinkler system. In one instance (Valparaiso University) a partial system was installed in the basement but the fire originated in the first story and spread to the second story.

It is significant that none of the 21 large loss school fires involved buildings of fire-resistive or noncombustible construction.

It is also worth noting when considering school fire protection that all except two of these fires spread beyond the floor of origin. Open stairways (14 cases) and nonfirestopped walls

(7 cases) were the most common routes followed by the fire in spreading to other stories. One of the two fires that did not spread beyond the story of origin occurred in a 1-story building without basement. The others originated in the attic while the school was occupied and burned off the roof.

Primary and Secondary Schools

April 9, Newtown Square, Pa., Marple-Newtown High School. $500,000

High school. The main section of this unsprinklered 2-story brick, wood-joisted school was destroyed by fire that originated in a partitioned-off area of the basement where a large shipment of new tables and chairs, still packed in excelsior and paper, were stored pending completion of a new addition. The fire was discovered by the janitor at noontime, after which the school fire drill alarm was sounded and all 580 pupils and 38 faculty members walked to safety as corridors and open stairways started to fill with smoke.

Burned telephone wires delayed fire department notification 15 minutes. Before apparatus arrived heat and fire had spread within air-conditioning ducts to second story classrooms.

The Nashville Tennessean

Lightning started the fire that destroyed the Franklin, Tenn. high school on January 29.

Trenton Times

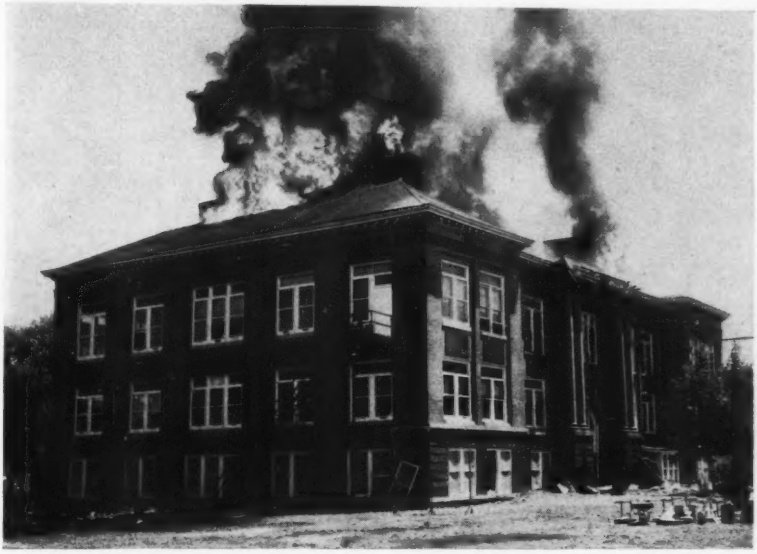
The 800 pupils at this Trenton, N. J. elementary school filed out quietly after fire was discovered in the third story on March 14.

June 2, near Camden, S. C., Blaney Grammar and High School. $500,000

Elementary and high school. Fire, believed set by someone who had previously robbed the school safe, destroyed teaching facilities for the 431 pupils who attended the 2-story brick, wood-joisted school. The fire originated in an open stairway at the first story level from where it spread to all parts of the undivided and unsprinklered building. Firemen responding from Camden 12 miles away at 5:30 A.M. used the 900 gallons of water carried in their trucks to protect a cafeteria and other exposures. No other water was available.

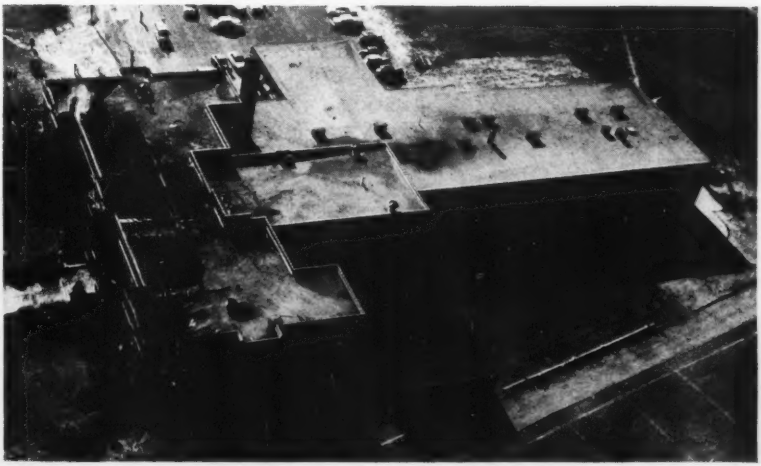
Nov. 30, Nevada, Mo., Nevada High School. $876,500

Junior and high school. Spontaneous heating of paint rags in the manual training department was the probable cause of fire that destroyed the 30,000 sq. ft. 4-story brick, wood-joisted building. Since no watchman or automatic protection was provided the fire was not discovered promptly and had spread within air conditioning ducts to classrooms in upper stories before it was seen by a passerby at 10:55 P.M.



Bremer Publishing Co.

The roof and attic of this Aurora, Nebr. grade and high school building were destroyed by fire that originated in the undivided and unsprinklered attic. The fire took place on July 10. During the morning several workmen had been making repairs to the building and roof. The fire was discovered while the men were at lunch.



R. Budgell

Fire set by prowlers on October 18 in a first story office had spread to the attic of an old section of the Port Credit, Ont. high school before discovery. A parapeted masonry wall prevented fire from spreading to the attic of the adjoining new section.

Wide World

One wing of the Piney Flats, Tenn. grade and high school was destroyed on November 14 by fire that was discovered by the janitor just as the first bus load of pupils arrived for the day's classes. Nonfirestopped walls, open stairs and poor water supplies hampered fire fighting.

Until a new school could be built the School Board solved the need for classroom space in part by renting a former grocery store and two garages.

University

June 13, Morgantown, W. Va., West Virginia University. $1,470,000

Engineering school classrooms, laboratories, shops, offices. Open stairways and corridors, freshly oiled floors, absence of sprinklers and delayed discovery by the watchman were the most notable factors contributing to the destruction of this 1-, 2- and 3-story brick, wood-joisted building with a 37,000 sq. ft. ground floor area. When the fire department arrived with one pumper, the fire had already spread from the first floor storage room of origin and was beyond the control of the local fire department. Mutual aid was summoned but the fire spread unchecked through corridors and up stairways to all parts of the undivided building. Firefighters concentrated on protecting exposures.

School Fires with Losses from $250,000-$500,000

Colleges and Universities

Jan. 7, Bethlehem, Pa., Lehigh University. $275,000

Nov. 27, Valparaiso, Ind., Valparaiso University. $450,000

Primary and Secondary Schools

Jan. 6, East Chicago, Ind., Garfield Elementary and Junior High School. $481,000

Jan. 16, Mapleton, Me., Mapleton High School. $250,000

Jan. 24, Cordele, Ga., O'Neal Grammar School. $375,000

Jan. 29, Franklin, Tenn., Franklin High School. $450,000 (*Photo, page 312*)

Jan. 31, Sturtevant, Wis., St. Bonaventure College. $284,000

March 6, Ogden, Utah, Lewis Junior High and Elementary School. $324,500

March 14, Trenton, N. J., Jefferson Grammar School. $250,000 (*Photo, page 312*)

March 21, Austin, Texas, Allan Junior High School. $374,000

May 14, Pomona, Calif., Pomona High School. $400,000 (*Photo, page 311*)

July 10, Aurora, Nebr., Aurora High School. $281,000 (*Photo, page 313*)

Oct. 10, Blythe Twp., Pa., Blythe Twp. School District. $350,000

Oct. 18, Port Credit, Ont., Port Credit High School. $320,000 (*Photo, page 313*)

Nov. 5, Paterson, N. J., Public School No. 24. $300,000

Nov. 14, Piney Flats, Tenn., Mary Hughes School. $272,500 (*Photo above*)

Dec. 5, Freeport, Ill., St. Mary's Roman Catholic School. $250,000

The Fourteen Largest Church Fires

The record of large loss church fires in 1956 explains the reason for the sudden widespread concern for church fire safety that first became apparent in late 1956. There were as many large loss fires in churches in 1956 (14) as in the preceding three-year period. These 14 fires caused $9,787,000 property damage, took three lives and injured 14. Six fires were known to have been set or were of suspicious origin.

Why was there a threefold increase in the number of large loss church fires in 1956? It would be reassuring if one could point to some unusual, temporary condition as responsible but unfortunately this was not the case. A study of the 5 fires summarized below will show that the same factors that were responsible for church fires in other years were also very much in evidence in the church fire disasters of 1956.* Bad church fires occurred in 1956 and will continue to occur in churches which were designed without proper attention to fire safety (e.g. large undivided attics, nonfirestopped walls) and in which no automatic fire protection has been installed (sprinklers, automatic fire detection systems). There is not a great deal that can be done about design weaknesses. Statements made by certain architects to the effect that church designs no longer contain these obvious weaknesses, if borne out in churches now building, and to be built in the future, hold out real hope.

*For a detailed study of church fire experience and for guidance in church fire safety see Occupancy Fire Record — Churches, published in May 1956 by the NFPA. Price 50 cents.

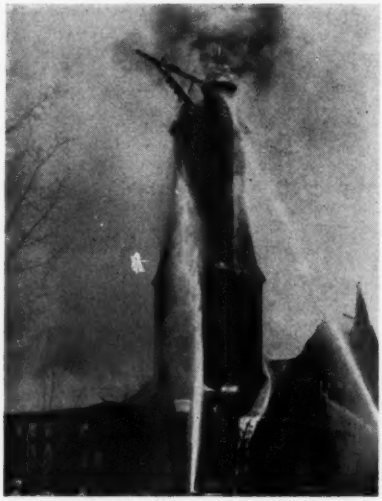
United Press

Similarly to the Plattsburg, N. Y. fire, this church fire in Newton, Mass. also originated in the basement furnace room and had made great headway before discovery by outsiders. There was no automatic fire protection. **(See story on page 316.)**

Feb. 11, Newton, Mass., First Eliot Congregational Church. $500,000

Fire that originated in the rear of the basement destroyed this 27,000 sq. ft. high 1-story stone, wood-joisted church because of fire protection weaknesses in the construction of the building and because of the absence of automatic fire protection. Extensive renovation of the church about two years before the fire had included a new heating system but did not include provision of a fire-resistive furnace room or installation of central-station-supervised automatic sprinkler or fire detection systems.

The fire originated in the rear of the basement where the not-cut-off furnace was located. The building was unoccupied and people in the neighborhood who smelled smoke about 6:00 P.M. neglected to notify the fire department, providing opportunity for the fire to make considerable headway before someone pulled a street box at 8:10 P.M. By then the fire had entered an inaccessible 4 ft.- to 5 ft.-high crawl space beneath the main auditorium and had also spread up through unprotected openings in the rear of the church to the large undivided attic.



The Newport Daily Express

Carelessness by an organ repairman may have caused this church fire at Newport, Vt., which took place on May 3.

*March 14, Trenton, N. J., St. Mary's Roman Catholic Church. $2,000,000; 3 killed

Three of the eight occupants asleep on the upper two floors of the 4-story rectory were trapped and killed by fire that originated in a first story reception room. In the absence of automatic or watchman protection the fire fed on combustible furnishings for at least an hour and was spreading up an open stairway to upper story corridors when seen by a pedestrian at 4:32 A.M. One of the five occupants to escape made his way down a rear stairway (he was the only one who had access to this stairway), three were taken from fourth story windows by aerial ladders and one jumped into a life net from a third story window.

*Fire spread to other buildings.

United Press

There were 400 worshippers in this Taftville, Conn. church when fire broke out on April 29.

On breaking through the slate roof of the rectory fire ignited the wood deck of the adjoining slate covered roof of the church. Once the fire entered the large concealed roof space, the church roof was doomed.

April 29, Taftville, Conn., Sacred Heart Roman Catholic Church. $500,000

Shortly after 400 worshippers assembled for the first Mass of the day several of those in front pews noticed smoke. On a signal from the sexton occupants started to file out and all escaped without incident, the only confusion resulting when some parishioners tried to re-enter for hats and coats. In the meantime the fire which had originated in the basement was spreading up within non-firestopped walls to the undivided attic.

Associated Press

An 18-year-old boy set fire to this unsprinklered church in Cambridge, Mass.

Hartford Fire Department

The second church disaster in two days occurred in Hartford, Conn. on Dec. 31. When discovered during morning services the fire was spreading within walls to the undivided attic.

Dec. 8, Cambridge, Mass., St. John's Roman Catholic Church. $750,000

An 18-year-old AWOL Army private confessed setting fire to church vestments in the basement after an unsuccessful attempt to open a church money box. The fire burned approximately 45 minutes in the unsprinklered church before being discovered by a passerby at 12:42 A.M. It was spreading upward through walls and open stairways when firemen arrived.

Dec. 31, Hartford, Conn., St. Joseph's Roman Catholic Church. $3,000,000

At approximately 6:00 A.M. the building superintendent and another church attendant saw smoke in the basement but neglected to notify the fire department. At 7:30 A.M. a deputy fire chief attending Mass, on being told of the smoke, went to the basement where fire could be heard "roaring" above the ceiling in front of the basement altar. The alarm was then sent but by then fire was spreading within nonfirestopped walls. Firemen pulled walls open but the fire was always ahead of them and soon burst into the undivided concealed attic. After breaking through the ceiling of the rotunda fire flashed throughout the upper interior structure of the church.

Church Fires with Losses from $250,000-$500,000

Feb. 5, Plattsburg, N. Y., First Methodist Church. $380,000

Feb. 20, Louisville, Ky., Second Presbyterian Church. $330,000

March 16, Chicago, Ill., St. Paul's Episcopal Church. $400,000

May 3, Newport, Vt., First Congregational Church. $400,000 (*Photo, page 316*)

July 28, Raleigh, N. C., Edenton Street Methodist Church. $475,000

Sept. 5, Chillicothe, Ohio, First Presbyterian Church. $352,000

Nov. 12, Springfield, Ill., First Congregational Church. $300,000

Dec. 16, Trenton, N. J., First Methodist Church. $300,000

Dec. 30, Hartford, Conn., St. Patrick's Roman Catholic Church. $250,000

Large Loss Aircraft Fires of 1956

Following is a list of the 87 "large loss" aircraft fire accidents of 1956 responsible for $122,830,000 in losses and 333 lives.

A separate study of these accidents is in course of preparation and will be published subsequently in an NFPA Aviation Bulletin.

Large Loss Aircraft Fires of 1956

Date	Place	Type Accident	Operator	Type a/c	Est. Loss	No. Killed
Jan. 3	near Amarillo AFB, Tex.	CF	USAF	B-47	$2,500,000	3
Jan. 4	Ellsworth AFB, So. Dak.	CF	USAF	B-36	$2,000,000	0
Jan. 5	near Swedesboro, N. J.	CF	USAF	H-16A	Over $2,000,000	2
Jan. 10	Eglin AFB, Fla.	CF	USAF	F-101A	$1,000,000	1
Jan. 25	Wright Patterson AFB, Ohio	FF	USAF	F-101A	$1,000,000	0
Feb. 2	near Atlantic City NAS, N. J.	CF	USN	AD5N	$ 250,000	3
Feb. 4	near Atlantic City NAS, N. J.	CF	USN	F2H4 Banshee	$ 400,000	1
Feb. 10	near Ellsworth AFB, So. Dak.	CF	USAF	RB-47	$2,500,000	6
Feb. 10	near Topeka, Kansas	CF	USAF	B-47	$2,500,000	3
Feb. 14	near Donelson, Tenn.	CF	USAF	C-119G	$ 300,000	0
Feb. 16	near Tracy, Calif.	FF	USAF	RB-52B	$8,000,000	4
Feb. 20	near Moraga, Calif.	CF	USN	F7U Cutlass	$ 750,000	1
Feb. 21	Palm Beach AFB, Fla.	FF	USAF	KC-97	$2,000,000	5
Feb. 27	near Dayton, Ohio	FF	USAF	B-50D	$1,500,000	11
Feb. 27	near Knob Noster, Mo.	FF	USAF	B-47	$2,500,000	4
Mar. 12	near Argentia, Nfld., Canada	CF	USN	SA-16 Albatross	$ 500,000	6
Mar. 19	near Fork Union, Va.	CF	USAF	B-57B	$1,000,000	2
Mar. 20	near Dobbins AFB, Ga.	CF	USAF	T-29	$ 750,000	2
Mar. 25	Biggs AFB, Tex.	CF	USAF	XB-51	Over $1,000,000	1
Mar. 27	Corpus Christi, Texas	CF	USN	AD4NA	$ 250,000	1
Mar. 28	near McConnell AFB, Kans.	FF	USAF	B-47	$2,500,000	3
Apr. 1	near Greater Pittsburgh Airport, Pa.	CF	TWA	404	$ 750,000	22
Apr. 3	near San Antonio, Texas	CF	USAF	TB-29	$ 750,000	1
Apr. 3	near Baltimore, Md.	CF	USAF	T-33	$ 500,000	2
Apr. 6	Travis AFB, Calif.	CF	USAF	C-124	$2,500,000	3
Apr. 6	near Ceresco, Neb.	FF	USAF	B-47	$2,500,000	4
Apr. 6	Malmstrom AFB, Mont.	CF	USAF	F-89	$ 500,000	2
Apr. 9	Opa Locka, Fla.	CF	USMC	FJ2	$ 250,000	0
Apr. 12	near Harrisburg, Pa.	FF	USN	F4D1	$1,000,000	0
Apr. 25	near Herrington, Kans.	FF	USAF	KC-97	$2,000,000	8
May 2	near Lincoln AFB, Neb.	CF	USAF	B-47	$2,500,000	4
May 9	New Castle County Airport, Del.	CF	USAF	F-94C	$ 700,000	0
May 15	Orleans, Ont., Canada	FF	RCAF	CF-100	$1,500,000	15
May 19	Kinross AFB, Mich.	FF	RCAF	CF-100	$ 500,000	2
June 1	near Lowry AFB, Colo.	CF	USAF	TB-25N	$ 250,000	4
June 6	Minn.-St. Paul Int. Airport, Minn.	CF	USAF	F-89	$ 500,000	3
June 9	Minneapolis, Minn.	CF	USN	F9F	$ 250,000	7
June 12	Hamilton AFB, Calif.	CF	USAF	F-86D	$ 700,000	0
June 14	Tarrant City, Ala.	CF	USN	F4U	$ 250,000	1
June 18	Tucson, Ariz.	CF	USAF	F-86D	$ 700,000	1
June 20	near Asbury Park, N. J. (off shore)	FF	LAV	Super G Constellation	$1,900,000	74
June 22	near Eglin AFB, Fla.	FF	USAF	F-89H	$ 700,000	0
June 22	N. Y. International Airport, N. Y.	CF	USAF	F-89D	$ 700,000	0

Date	Place	Type Accident	Operator	Type a/c	Est. Loss	No. Killed
June 26	near Smoky Hill AFB, Kans.	CF	USAF	B-47E	$2,500,000	3
June 26	near Walker AFB, N. M.	FF	USAF	KC-97	$2,000,000	11
July 2	Charleston AFB, S. C.	CF	USAF	F-86D	$ 700,000	0
July 6	near Goose AFB, Labr., Canada	FF	USAF	KC-97E	$2,000,000	6
July 9	Eglin AFB, Fla.	CF	USAF	F-102-A	$1,000,000	0
July 13	Smoky Hill AFB, Kansas	CF	USAF	B-47	$2,500,000	4
July 25	New Castle, Pa.	CF	USAF	T-33	$ 500,000	0
July 26	Glynco NAS, Ga.	GF	USN	ZS2G Airship	$1,000,000	0
July 27	near Federal, Wyo.	CF	USAF	C-119	$ 300,000	4
Aug. 8	Boca Raton, Fla.	CF	E. S. Heckathorn	C-82	$ 250,000	5
Aug. 16	San Salvador Is., Bahamas	CF	USAF	C-124A	$2,500,000	1
Aug. 16	Grenier AFB, N. H.	CF	USAF	F-80C	$ 250,000	1
Aug. 22	Palm Beach AFB, Fla.	CF	USAF	C-124	$2,500,000	3
Aug. 27	Edwards AFB, Calif.	CF	USN	F11F	$1,000,000	1
Aug. 27	Sanford, Fla.	CF	USN	AJ2	$ 500,000	5
Aug. 29	Cold Bay, Alaska	CF	CPL	DC-6B	$1,500,000	15
Sept. 10	near Andrews AFB, Md.	CF	USAF	F-86D	$ 700,000	0
Sept. 17	near Madera, Calif.	FF	USAF	B-52	$8,000,000	5
Sept. 21	near San Bernardino, Calif.	CF	USAF	F-86	$1,000,000	0
Sept. 21	near Culverton, L. I., N. Y.	CF	USN	F11F1	$1,000,000	0
Oct. 2	Tyson AFB, Tenn.	CF	USAF	T-33A	$ 500,000	2
Oct. 2	Rockland, Mass.	CF	USN	F9F6	$ 250,000	1
Oct. 3	Charleston AFB, S. C.	CF	USAF	C-124	$2,500,000	3
Oct. 5	March AFB, Calif.	CF	USAF	B-47	$2,500,000	3
Oct. 6	near Mitchell AFB, N. Y.	CF	USAF	T-33	$ 500,000	1
Oct. 9	Mascoutah, Ill.	CF	USAF	F-86D	$ 700,000	0
Oct. 24	Midland, Tex.	CF	USAF	T-33 & Cessna 170	$ 550,000	7
Oct. 24	near Big Spring, Tex.	CF	USAF	T-33	$ 500,000	1
Oct. 25	Lake Charles AFB, La.	CF	USAF	B-47	$2,500,000	4
Oct. 29	Miramar NAS, Calif.	CF	USN	FJ3M	$ 250,000	3
Nov. 1	near Underhill Center, Vt.	FF	USAF	F-86D	$ 700,000	0
Nov. 9	North Bergen, N. J.	CF	Bonded Gas & Oil Co.	Beechcraft	$ 250,000	5
Nov. 9	off Maryland Coast	FF	USN	P5M	$ 500,000	10
Nov. 13	near Oklahoma City, Okla.	FF	Okla. ANG	F-80	$ 250,000	1
Nov. 15	near Lowry AFB, Colo.	CF	USAF	B-36	$3,500,000	0
Nov. 16	near El Toro MAS, Calif.	CF	USMC	F9F5	$ 250,000	0
Nov. 17	Vincent AFB, Ariz.	CF	USAF	F-86D	$ 700,000	1
Nov. 17	Lincoln AFB, Neb.	CF	USAF	1 – F-80C & 2 – B-47's	$6,000,000	3
Nov. 27	near Pensacola, Fla.	CF	USN	HTL-6	$ 250,000	0
Nov. 30	LaGuardia Field, N. Y.	CF	N. Y. Airways	S-58	$ 270,000	1
Nov. 30	near Port Arthur, Ont.	FF	USAF	B-47	$2,500,000	0
Nov. 30	near Castle AFB, Calif.	CF	USAF	RB-52B	$8,000,000	10
Dec. 4	near Bedford, Que.	CF	RCAF	CF-100	$ 500,000	1
Dec. 5	Inglewood, Calif.	CF	USAF	T-33	$ 510,000	0
					$122,830,000	333

Key to Abbreviations

a/c — Aircraft
AFB — Air Force Base
ANG — Air National Guard
CF — Crash Fire
CPA — Canadian Pacific Airlines
FF — Flight Fire
GF — Ground Fire
LAV — Linea Aeropostal Venezolana
MAS — Marine Air Station
NAS — Naval Air Station
RCAF — Royal Canadian Air Force
TWA — Trans World Airlines
USAF — United States Air Force
USMC — United States Marine Corps
USN — United States Navy

Other Large Loss Fires of 1956

In addition to the 366 fires summarized or listed in the broad occupancy groupings found elsewhere in this issue of the QUARTERLY there were 64 other large loss fires that caused $53,335,500 loss, 51 deaths and 567 injuries. These fires were distributed among the following wide variety of occupancies: armories, bank, barns, bowling alleys, bridges, buildings under construction, buildings being demolished, court house, forest fires, garages, hangars, ice arenas, laundries, logging camp, lumber yards, office buildings, oil well, piers, round house, ships and train-tank collision.

In this group of 64 fires there was one building with partial sprinkler protection and two piers with complete systems. Sprinklers installed on the stage at the Newburgh, N. Y. motion picture theatre helped to prevent fire that originated in the auditorium from spreading to the stage. Sprinkler protection for the Portland, Ore. pier and pier buildings was shut off at the time of the fire due to damage from freezing during the previous winter. A rapid spreading and intense fire in the New York pier shed overtaxed the water supply for sprinklers.

Arenas

Nov. 18, Lewiston, Me., St. Dominic's Arena. $515,000

Ice hockey rink. An overheated compressor in the not-cut-off wooden refrigeration room attached to the rear of the arena was the probable cause of fire that destroyed the unsprinklered 240 ft. by 130 ft. wooden building. An explosion of ammonia released by the fire blew out one wall of the compressor room and alerted neighbors at 12:35 P.M., about 2 hours before the scheduled start of a hockey game. Fire spread from the not-cut-off compressor room to the auditorium and was out of control when fire fighters arrived.

Had the compressor been installed in a detached noncombustible building as recommended by the fire department, this large fire would not have occurred. (See photo page 324.)

Armory

Jan. 22, Winnipeg, Manit., Canadian Government. $600,000; 1 killed

Armory. A cigarette accidentally dropped between cushions of an upholstered chair in the Sergeant's Mess was the probable cause of fire that spread through the unsprinklered 64,500 sq. ft. 2- and 3-story brick, steel-framed building and burned off the roof. Fire had made great headway before discovery by the boiler attendant at 6:04 A.M., having burned through the second floor to the first story. Firemen appeared to be getting the upper hand by 8:00 A.M., when it was discovered that the fire had entered the 4-ft.-high concealed space beneath the roof. (See photo page 324.)

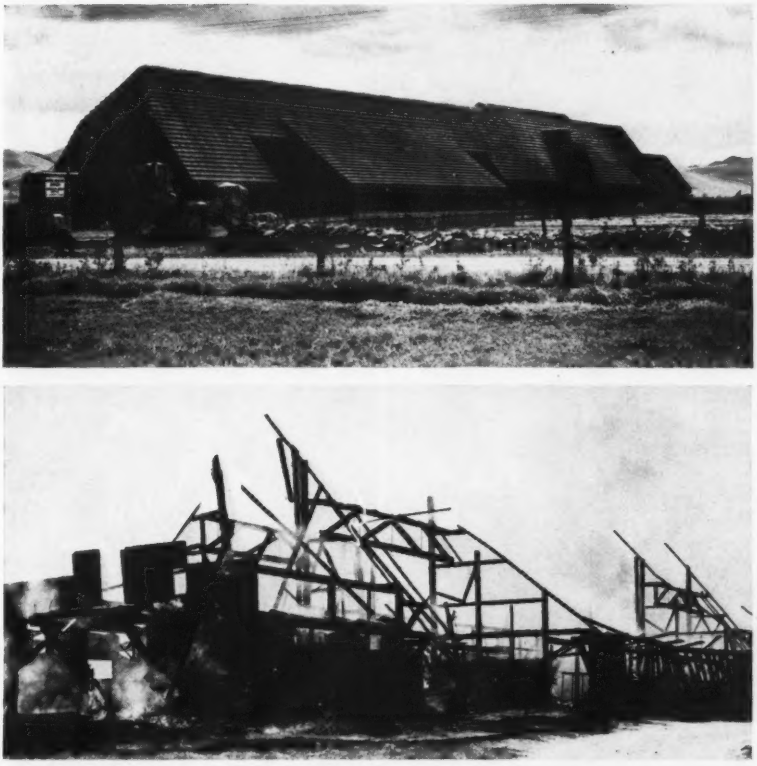
A fire officer suffered a heart attack while fighting this fire.

Building Being Demolished

July 14, New York (Manhattan), N. Y., Wanamaker Department Store. $800,000

Building in course of demolition. During demolition of this 330 ft. by 195 ft. 5-story former department store (exterior facing and interior columns cast iron, beams wrought iron, floor and roof systems wood) fire broke out in the subbasement. Sparks from a cutting torch being used by the demolition crew were the probable cause. The fire apparently smoldered and burned for several hours before smoke was noticed coming from upper story windows at 5:45 P.M. The watchman who patrolled outside the building only had been aware of smoke but did not recognize its significance. After completing his 5:15 P.M. round he went home for dinner.

First arriving firemen found the basement and subbasement in flames and because of the tremendous headway could not fight the



The Independent Record

This stock farm barn near Helena, Mont. was destroyed by fire that broke out in the undivided attic on September 27, while hay was being ground and stored in the attic. The Swiss type barn had been built in 1914.

fire from the inside. Fire spread up a large light well mushrooming on upper floors and also extended vertically through openings made by demolition crews, open stairways and elevator shafts, many of which were not within range of hose streams directed through windows from the street.

During the 25 hours required to bring the fire under control an estimated 50,000,000 gallons of water was used. Much of the water entered subways causing damage that interrupted service for five days. Water also flowed through basement tunnels to an adjoining 14-story building, also formerly occupied by the department store, and being converted to an office building when the fire occurred. Water and mud caused $440,000 loss in the basements of this exposure.

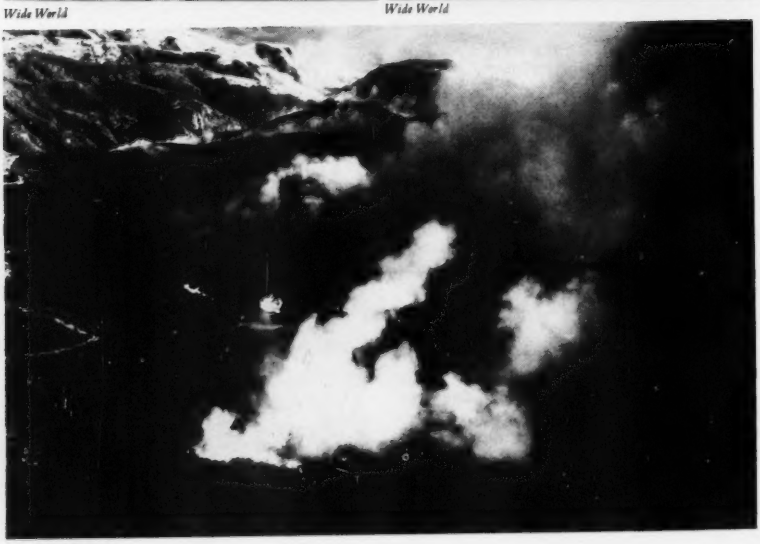
Wide World

The Wanamaker fire in New York, July 14.

Wide World

Wide World

Wide World



Pacific Air Industries

Forest Fires

Feb. 24, Columbia and Baker Counties, Florida, Oceola National Forest. $500,000

109,600 acres. During a landowner's prescribed burn, fire got out of control and burned through swamps and bays in both National Forest and privately owned land. Considerable merchantable timber and young growth, brush and litter were consumed.

June 15, near Winslow, Ariz., Sitgreaves National Forest. $4,175,500

21,389 acres. Winds of near gale velocity spread fire that broke out during lumbering operations, out of control of 800 fire fighters and eventually flames destroyed 21,389 acres of ponderosa pine. Other fire fighters and equipment were flown to the scene from California to aid in suppressing the fire. Cause is unknown.

Sept. 21, near San Bernardino, Calif., San Bernardino National Forest. $2,450,000; 1 killed

10,250 acres, 3 dwellings, 3 house trailers, 2 outbuildings. Crash of a U. S. Air Force jet airplane started fire about 1½ miles from the nearest road in the forest. Initial fire attack was made by 8 men taken to the fire scene by helicopter. Men and equipment used to combat the blaze included 1,400 fire fighters, 151 pumper tankers and water hauling equipment, 8 air tankers, 25 tractors and 3 helicopters. One fire fighter was trapped and fatally burned.

A converted torpedo bomber and 7 Stearman air tankers were used to make water-chemical drops on the fire utilizing a low-level bombing type of attack. During four days of operation the aerial tankers made 458 flights dropping 43,260 gallons of water and water-borate solution on the fire. In one instance the air tankers were used to extremely good advantage to slow down the fire spread to permit escape of trapped fire fighters.

Photos opposite were taken during the three-day fire near Malibu California which started on Dec. 26 and swept over 22,000 acres and destroyed 140 buildings.

Estimated cost of fire suppression was $450,000.

Nov. 19, near San Bernardino, Calif. National Forest. $1,813,500; 1 killed

15,296 acres, 4 buildings. A bulldozer operator was killed in this forest fire believed caused by careless disposal of smoking materials. Four buildings of the Trojan Powder Company were destroyed or severely damaged. Cost of suppression was $400,000.

Nov. 24, San Diego County, Calif., Cleveland National Forest. $600,000; 11 killed

43,611 acres, 5 dwellings. Reportedly set by a 16-year-old boy, fire raced through the Cleveland National forest for 4 days before being controlled on November 28. On November 25, 11 fire fighters were trapped in a canyon by the blaze and fatally burned.

A total of 2,000 men, 3 helicopters, 4 air tanker planes, 2 scouting planes, 27 bulldozers and 90 stake, tank and pickup trucks were used in combating the blaze. Cost of fire suppression was $400,000.

Dec. 26, Malibu, Calif., $6,000,000; 1 killed

22,000 acres, 35 dwellings, 105 unidentified buildings. Fire raced through acres of dry watershed destroying homes, outbuildings and wildlife for three days. Low humidity and high winds made conditions ideal for fire spread. Dwellings with wood shingle roofs were particularly vulnerable to burning brands from the forest fire. One man who was returning to his home by automobile after having evacuated his family ran off the highway and was thrown from the vehicle. Suffering a broken leg he apparently was unable to escape the flames and was fatally burned.

Garages

Nov. 27, near Calgary, Alta., Canadian Government. $2,150,000

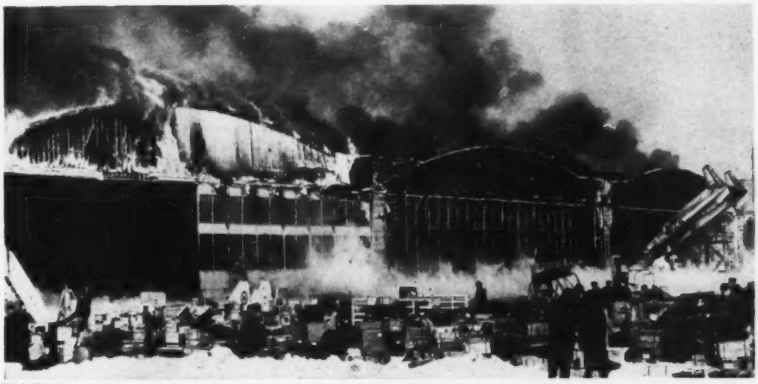
Garage containing 13 centurion tanks. A mechanical digging machine doing excavating work 6 ft. from the 240 ft. by 80 ft. 1-story masonry, wood-joisted building snagged and broke a natural gas main. Gas escaping under 10 pounds pressure entered the building and exploded 15 minutes after

Lewiston Sun-Journal

The refrigeration room, where this fire originated, was not cut off from the rest of the Lewiston, Me. ice hockey arena. The fire was not detected until an explosion, reportedly involving ammonia released by fire damage to the refrigeration equipment, alerted neighbors. **(See report on page 320.)**

Bill Rose

Firemen appeared to be gaining control of the fire in this armory at Winnipeg, Manit. when it was discovered that the flames had entered the 4-ft-high concealed space beneath the wood roof deck. **(See story on page 320.)**



Wide World

This hangar fire at Dorval, Que. originated in a storage area on the mezzanine and extended to the roof of the unsprinklered wooden building and spread rapidly when doors were opened to remove aircraft. The fire occurred on March 19.

the break occurred. Fire that immediately involved the interior continued to burn until the building and its contents were destroyed.

Hangars

Mar. 19, Dorval, Que., Canadian Government. $2,164,500

Only partial information is yet available on this fire which destroyed the unsprinklered 600 ft. by 220 ft. wooden aircraft hangar occupied by the Royal Canadian Air Force at the Montreal Airport. The fire was detected by an occupant about 8:50 A.M. starting in the storage section on a mezzanine floor. Apparently, there was only a few minutes' delay in detection of the fire but information received so far indicates that it extended to the roof and then spread rapidly when hangar doors were opened to take out aircraft. A strong wind was blowing at the time.

July 26, Bunker Hill Air Force Base, Ind., United States Government. $1,000,000

Maintenance hangar, two F-94C jet aircraft. A cutting torch that was used to cut reinforcement bolts in a truss supporting a hangar door started a fire in the truss that was not noticed by an occupant until 1½ hours later. At time of discovery hangar doors were closed and only a small flame was visible. When the doors were opened at each end of the building to remove aircraft, flames flashed across the under surface of the roof of the 160 ft. by 200 ft. unsprinklered wooden hangar. Air Force personnel were able to remove three F-94C jets and a T-33 jet trainer before the roof was completely enveloped in flames. Two F-94C's could not be removed.

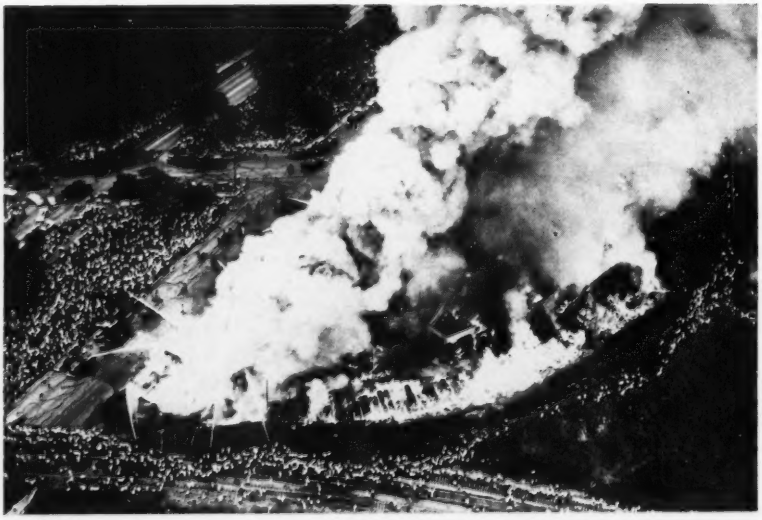
Lumber Yards

Ed Farlie

Lack of a watchman and automatic fire protection allowed fire to make great headway in this East Rutherford, N. J. lumber yard on Oct. 20, 1956 before discovery by a neighbor.

E. H. Maguire

In addition to the destruction of this lumber yard at Bridgeport, Pa., on May 11, 1956 fire destroyed four neighboring dwellings and damaged several others. Due to the absence of automatic protection or watchman service, the fire was not discovered until noted in an advance stage by a milkman at 4:30 A.M.



United Press

Congestion and delayed discovery were primarily responsible for this lumber yard fire at Chicago, Ill., on Aug. 19, 1956. As in the case of the fire at Bridgeport, Pa., (see photo above), the fire was not discovered until seen by a passerby.

Ray Welch

Absence of wind was an important factor in the successful protection of several buildings seriously exposed by this Elgin, Ill. lumber yard fire on Oct. 15, 1956.

June 18, Glen Rock, N. J., Leone Lumber and Supply Co. $545,000†

Retail lumber yard. Originating at one end of the lumber yard fire spread before high winds to the large 1- and 2-story masonry, wood-joisted storage building before discovery by an outsider at 5:44 A.M. Since the building was unsprinklered and undivided there was nothing to prevent the fire from spreading. No watchman or automatic protection was provided.

*Nov. 3, Los Angeles, Calif., American Hardware Co., et al. $915,000†

Lumber yard, cardboard carton assembling. Six lumber storage sheds with 40,000 sq. ft. total area, 8,000 sq. ft. of yard-stored lumber and two wooden buildings of the exposed carton assembling plant were destroyed by fire that originated in the shipping room in one of the lumber sheds. Reports list an overheated extension cord as the cause and state that the fire was not discovered promptly because the supervised watchman had left the premises to watch a television show. On his return he found the fire involving the combustible fibreboard suspended ceiling and after attempting to control it with first aid equipment summoned the fire department over a private fire alarm box. The entire unsprinklered building was engulfed in flames when firemen arrived five minutes later. Intense heat, congested combustible buildings, yard storage and low humidity were factors responsible for the spread of fire to other buildings.

Sprinklers saved a brick, wood-joisted building adjoining the shed where the fire started. Six minutes after the alarm heat entered this building through plain glass windows fusing 18 sprinklers.

*Fire spread to other buildings.

†Figures include business interruption loss.

Piers

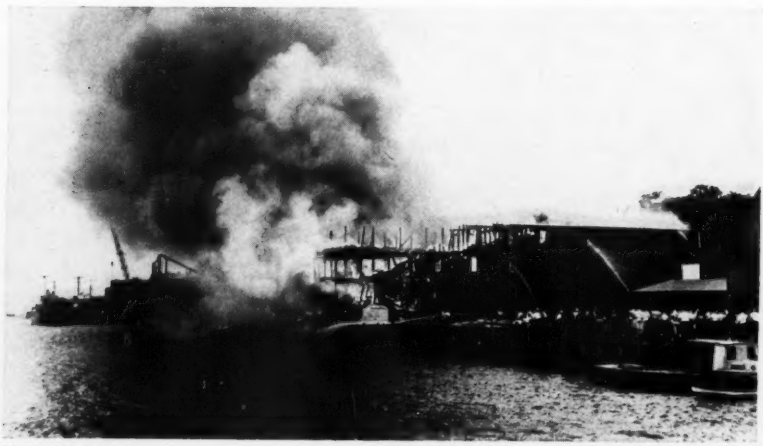
June 28, San Francisco, Calif., Tidewater Associated Oil Co., et al. $750,000

Oil pier; tank barge. During transfer of gasoline from a tank barge tied up at a wooden pier, a pump on the barge slipped out of gear resulting in gasoline being pumped overboard instead of into a pier pipeline. More than 9,000 gallons had gone overboard before the pumps were stopped. Gasoline spread out on the water and surrounded another barge tied up on the opposite side of the 130-ft.-wide pier where it was being repaired by a welder. Explosive ignition of the gasoline vapors blew the welder into the water (he managed to reach shore) and flames flashed back to the tank barge being unloaded where a violent explosion ripped apart one of the cargo tanks and destroyed the superstructure. The barge operator was blown into the water and escaped by swimming under water.

Fireboat and land companies responded but because of the location of the fire and the poor water supply from mains the fireboat

Newburgh News

The partial sprinkler system that protected the stage at this Newburgh, N. Y. theatre helped keep fire in the auditorium from spreading to the stage. The fire department pumped into the sprinkler system. The fire took place on February 15.



Liverpool Fire Department

Wind-driven flames destroyed five wharf buildings, two fishing boats and parts of two wharves at Liverpool, N. S. on July 1. **(See report, page 329).**

was primarily responsible for bringing the fire under control. After rescuing a crew of workmen stranded on the end of the pier the fireboat crew used deck and turret nozzles to control the fire on the pier, barge and a 5,700 sq. ft. combustible pier shed, then sent firemen manned with 1½-in. lines under the unsprinklered pier in skiffs to extinguish the fire in the pier substructure. Damage resulted to 22 per cent of the pier.

*July 1, Liverpool, N. S., Nickerson Bros., et al. $770,000

Five wharf buildings, two 30-ft. fishing boats and parts of two wharves were destroyed by fire that originated in a pile of rubbish on the water side of the wharf on a Sunday afternoon. Since a watchman was only hired to patrol the property at night the fire burned unnoticed until seen by the crew of a pleasure craft. Efforts to put out the fire with an extinguisher failed as flames spread to a wooden wall of one of buildings.

Despite prompt response by firemen high winds soon drove the flames to adjacent wharf buildings and embers ignited a wharf and wharf warehouse ¼ mile away.

Indirect but very real losses caused by the fire included loss of jobs for about 50 men, loss of a source of ice and bait for fishermen, loss of a source of ice for a fish processing plant and loss of revenue to the town from taxes, water and power.

*Fire spread to other buildings.

*Sept. 5, Portland, Ore., Zidell Machinery and Supply Co., et al. $2,096,000

Thirty buildings: 22 occupied by two scrap metal salvaging companies, one occupied as a new steel warehouse; six dwellings; wharf. During a period of extreme drought and high winds fire broke out in or beneath the deck of the 1,000 ft. by 600 ft. wharf on which most of the buildings destroyed by the fire were located. Careless disposal of smoking materials was the probable cause. When first seen a few minutes after noon fire was coming up from between wharf deck planks inside a 275 ft. by 50 ft. 1-story wooden storage building. This, the wharf substructure and other wharf buildings were sprinklered but all systems had been shut off due to freezing the past winter.

When the fire was discovered about 200 employees were rounded up and efforts were made to control the fire with standpipe hoses. The fire department was not called until about 15 minutes later. On arrival firemen found wind-driven flames spreading rapidly through combustible buildings on the wharf, the wharf itself in flames and the roofs of six dwellings on the exposed side of a nearby hill burning.

United Press

Detonation of 1,950 cartons of cordeau detonant fuse was the probable cause of a violent explosion 25 minutes after fire broke out on this New York, N. Y. pier on December 3. Ten persons were killed and 247 injured by the explosion as reported on page 330.

Dec. 3, New York (Brooklyn) N. Y., Luckenbach Steamship Co., et al. $7,600,000; 10 killed

Twenty-five minutes after fire broke out on this pier an explosion occurred that killed 10 pier employees and spectators and injured 247. The pier was 1,748 ft. long by 150 ft. wide. Principal features were a 14-in. thick reinforced concrete pier deck on wood piling topped by a two-inch asphalt wearing surface. A steel-framed, metalclad pier shed extending the length of the pier was protected by dry pipe sprinkler systems supplied by an 8-in. pier main. Draft curtains were installed so that not more than 200 sprinklers were between adjacent curtains.

The pier was heavily loaded with combustible materials including flammable liquids, baled sisal, foam rubber and Cordeau detonant fuse, the latter a shipment of 37,000 pounds gross weight in 1,950 cartons. This quantity is estimated to contain about 7½ tons of a Class A explosive.

Sparks from a welding torch being used to repair the roof of the storage shed are said to have landed on a large pile of burlap-wrapped foam rubber. An exact account of what happened during the next few minutes is not available, but from a knowledge of the rapid flame-spread characteristics of burlap and the intense and rapid burning characteristics of foam rubber it can be surmised that an intense and rapid-spreading fire enveloped the pile of foam rubber and extended to other piles of congested storage. Sprinklers probably opened without appreciable delay and held the fire beneath in check during the first few minutes, but with the fire spreading rapidly to other congested cargo ahead of the opening sprinklers, so many must have opened in the draft curtain area of origin and in adjacent areas that the water supply was quickly overtaxed. The fire was out of control when the first fire apparatus arrived.

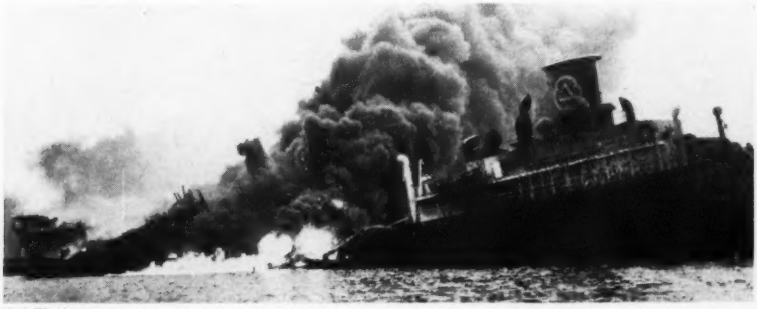
Twenty-five minutes after the first alarm a terrific explosion occurred at about the midpoint of the pier. It was this explosion that caused the casualties and widespread property damage. In addition to a hole 175 ft. by 75 blown in the pier, the explosion moved an adjacent pier out of line 15 to 18 inches and broke sprinkler piping. Neighboring buildings were extensively damaged and windows several miles away were broken. Since the only explosive material or material with similar explosive properties known to be on the pier was the Cordeau detonant fuse it is assumed that the pile of cartons of fuse detonated en masse.

Twenty-five firemen in the pier shed were knocked down and the seven-man crew of a fireboat were blown into the water, but miraculously no fire fighters were killed. By 6:40 P.M., three hours and 27 minutes after its start, the fire was under control.

Ships

Jan. 17, near Lake Charles, La., Cities Service Oil Co., et al. $3,171,500; 21 killed

10,584 gross ton tanker; three tank barges; two loading docks. During loading of the tanker an explosion occurred in a cargo tank into which kerosene was being loaded. The explosion ripped open the ship, killed 18 crewmen and three shore employees and was followed by fire that practically destroyed the tanker, three tank barges tied up nearby and two loading



Wide World

Twenty-one persons were killed when an explosion ripped open this tanker while being loaded at a pier near Lake Charles, La., January 17.

docks. U. S. Coast Guard investigators have concluded that the explosion occurred in a cargo tank into which kerosene was being introduced and that discharge of static generated by the splashing and turbulance ignited gasoline vapors in the tank. Adjoining cargo tanks had been filled with gasoline and there is evidence that a leak had been discovered in the bulkhead between the gasoline and kerosene tanks just prior to loading of the kerosene tank.

Oct. 11, near Memphis, Tenn., Franklin Limestone Co. $500,000

Barge towboat "Elmo Foster." Twelve miles south of Memphis the barge towboats "Elmo Foster" (southbound) and "Harry Truman" (northbound) collided in the Mississippi. The 121-ft.-long 1,200 hp diesel-powered "Elmo Foster" ignited and burned to the water line. Seven of her crew were injured but no one was lost.

Miscellaneous Other Fires with Losses from $250,000-$500,000

Arenas

Jan. 23, Baltimore, Md., Carlin's Park, Inc. $250,000

Armories

*Nov. 3, Auburn, Me., National Guard Armory, et al. $250,000

Barn

Sept. 27, near Helena, Mont., Green Meadow Stock Farm. $300,000 (*Photos, page 321*)

Bowling Alleys

March 26, White Horse, N. J., White Horse Bowling Academy. $330,000

*May 26, Ketchikan, Alaska, Thunderbird Bowling Alley, et al. $446,000

Building Being Demolished

*Aug. 22, Chicago, Ill., Armour & Co., et al. $250,000

Buildings under Construction

*April 22, Sacramento, Calif., The Midtown Building, et al. $251,000

Dec. 20, Toronto, Ont., Samuel Diamond. $250,000

Dec. 27, Linden, N. J., Public Service Electric and Gas Co., et al. $325,000

Clubs, City and Country

Jan. 2., Phoenixville, Pa., Slovak-American Citizens Club. $250,000

Feb. 29, Addison, Ill., Brookwood Country Club. $393,000

*March 1, Kokomo, Ind., Ibn Saud Grotto, et al. $283,000†

Courthouse

Jan. 11, Douglasville, Ga., Douglas County Courthouse. $400,000

Forest Fires

June 13, Huslia River No. 2, Alaska. $310,000

June 19, Prescott, Ariz., Prescott National Forest. $451,000

October 13, Red Lake Indian Resv., Minn. $350,000

Garages

*Feb. 6, Hoopeston, Ill., J. B. Sims Motor Sales, et al. $259,000

*Feb. 20, Kankakee, Ill., Lang Motors. $275,000

Sept. 24, Traverse City, Mich., Grand Traverse Auto Co., et al. $339,500

Nov. 11, Clifton Heights, Pa., Belcher Buick Co. $300,000

Dec. 12, Chicago, Ill., S. H. Arnolt, Inc. $300,000

Laundries

*Feb. 16, Chalk River, Ont., Atomic Energy of Canada Ltd. $400,000

April 24, Baltimore, Md., Security Laundry Co. $350,000

Logging Camp

Sept. 15, near Beacon, Wash., Tony Fernandez Logging Co. $340,000

Lumber Yards

*May 11, Bridgeport, Pa., I. F. Marches Lumber Co., et al. $344,500 (*Photo, page 326*)

*May 30, Adams, Mass., Stanley Lumber, Coal and Grain Co. $339,000

*Aug. 19, Chicago, Ill., Czerwik Lumber Co. $375,000 (*Photo, page 327*)

*Oct. 15, Elgin, Ill., Elgin Lumber and Supply Co., et al. $342,500 (*Photo, page 326*)

*Oct. 20, East Rutherford, N. J., Cooper Lumber Co. $295,000 (*Photo, page 325*)

Motion Picture Theatres

Feb. 15, Newburgh, N. Y., Academy Theatres, Inc., et al. $325,000 (*Photo, page 328*)

*April 2, Daytona Beach, Fla., Gulf Theatres, Inc., et al. $269,500

*Dec. 8, Fort Dodge, Ia., Varsity Theatre, $388,000

Dec. 30, Elgin, Ill., Rialto Theatre, et al. $490,000†

Night Club

Dec. 30, Omaha, Nebr. Colony Club, et al. $309,000†

Office Buildings and Banks

Feb. 1, Los Angeles, Calif. United Merchants and Manufacturers, Inc., et al. $316,000†

March 13, Elyria, Ohio, Elyria Masonic Temple Building. $402,000

June 14, Logansport, Ind., National Bank of Logansport. $284,500

Nov. 25, Pittsburgh, Pa., Forbes Building. $285,000

Oil Well

Dec. 23, near Valleyview, Alta., Hudson Bay Oil and Gas Co. $302,000

Railroad Bridge and Freight Train

May 4, near Promontory Point, Utah Southern Pacific Railroad Co. $300,000

Nov. 27, near Michigan City, Ind., Chesapeake and Ohio Railroad, et al. $250,000; 5 killed

Roundhouse

Oct. 25, Buffalo, N. Y., Baltimore and Ohio Railroad. $350,000

Ships

March 30, Baytown, Texas, Esso Shipping Co. $300,000

Oct. 19, near Lake Charles, La., Cities Service Oil Co. $300,000

*Fire spread to other buildings.

†Figure includes business interruption loss.

Fire Record of Cities, 1956

As Reported by Municipal Authorities

The following tables summarize fire department reports for 1956 in 652 of the 699 cities with population over 20,000 in the United States and Canada.

These statistics have been collected and published in the April QUARTERLIES since 1939. These tables should not be used as a basis of comparisons between cities, as comparisons based on these statistics may be misleading if used without a full understanding of the many factors which should be taken into consideration in making any comparisons between cities. The principal discrepancy results from the wide variation among fire officials as to what constitutes a fire loss. Certain reports include only insured losses, others only uninsured. Whether or not property is insured has no bearing on the actual value of property destroyed. The chance effect of some single loss fire, differences in degree of industrialization, in topography, climate and age of cities are some of the factors that influence the fire record. In other words, fire losses reflect the composite results of many factors in addition to fire department efficiency and therefore the practice of making comparisons among different cities based on these data is to be discouraged.

Fire departments of 548 United States cities and 46 Canadian cities of over 20,000 population have reported their estimates of fire loss, fire alarms, building fires, and false alarms for 1956 to the NFPA Department of Fire Record.

A total of 570 United States cities having more than 20,000 population reported a fire loss for the year 1956 of $245,443,000. Fifty Canadian cities having a total population of 4,971,077 reported a loss of $28,968,000 for 1956.

The average loss per person in the 570 U. S. cities reporting losses was $4.39, 19.0 per cent more than the $3.69 average loss in 1955. The per capita loss in the 50 Canadian cities reporting losses was $5.83, a 20.7 per cent increase from 1955.

The average loss per building fire in 515 U. S. cities for 1956 was $1,075, compared with $931 in 1955. The average building fire loss in 41 Canadian cities was $1,210 in 1956, $895 in 1955.

The total number of building fires reported by 584 U. S. cities was 249,590, an average of 4.1 fires per 1,000 population, as compared with 4.0 building fires per 1,000 population in 1955 and 3.9 in 1954. Forty-eight Canadian cities reported 22,169 building fires in 1956. The number per 1,000 population was 4.5 in 1956 as compared with 5.1 in 1955.

Motor vehicle fires reported by 576 U. S. cities totaled 62,623, an average of 1.03 fires per 1,000 population. Fifty Canadian cities reported 3,447 motor vehicle fires, or 0.70 per 1,000.

Fire departments in 583 U. S. cities of more than 20,000 population answered 845,130 alarms in 1956. The number of alarms in 51 Canadian cities was 64,281.

In the United States, 579 cities of over 20,000 reported 67,444 false alarms in 1956. This was 8.0 per cent of the total calls. It will be noted that these are "malicious false alarms," not cases where smoke or steam, etc., was honestly mistaken for fire. The 8,450 false alarms reported by 49 Canadian cities were 13.1 per cent of their total calls.

Fire departments have been very cooperative in furnishing fire loss figures. Most of the 55 nonreporting cities did not record their fire experience. A number of loss figures are indicated in the Tables as preliminary estimates.

1956 FIRE LOSSES, CITIES OF 20,000 POPULATION AND OVER

As Reported by Municipal Authorities

	Total Loss in 1,000's	No. Alarms	Bldg. Fires	False Alarms	Bldg. Fires / 1,000 Pop.
ALABAMA					
Anniston	53	535	195	18	6.3
Bessemer	38c	255	120	11	4.2
Birmingham	675	4,611	1,085	428	3.6
Dothan City	268c	469	182	9	8.5
Florence	...	378	117	20	4.9
Gadsden	193	852	206	47	3.7
Mobile	153c	1,484	662	88	5.2
Montgomery	399ad	1,163	466	97	2.4
Phenix City	...	...	...	...	..
Selma	61	229	148	4	6.5
Tuscaloosa	126	510	280	26	6.1
ARIZONA					
Phoenix	619ac	2,529	688	121	6.5
Tucson	277	1,455	200	98	4.4
ARKANSAS					
El Dorado	88	361	97	29	4.2
Fort Smith	...	1,234	199	34	4.2
Hot Springs	228	399	147	24	5.0
Little Rock	...	2,033	625	228	6.2
N. Little Rock	587	1,235	238	9	5.7
Pine Bluff	...	533	219	5	5.9
CALIFORNIA					
Alameda	162	783	193	91	3.0
Alhambra	41	1,180	129	59	2.5
Arcadia	173	463	97	13	4.2
Bakersfield	149c	1,048	202	101	5.9
Berkeley	391	2,016	559	86	4.9
Beverly Hills	139	445	146	26	5.1
Burbank	261	1,126	356	7	4.6
Compton	191	747	170	15	3.6
Eureka	63	361	153	62	6.7
Fresno	415	1,026	372	206	4.1
Glendale	350	1,030	333	105	3.5
Huntingt'n Pk.	481c	295	116	8	3.9
Inglewood	427c	1,007	201	10	4.4
Long Beach	1,034c	2,104	895	66	3.7
Los Angeles	...	31,548	9,457	2,355	4.8
Los Angeles Cty	...	...	...	...	..
Lynwood	46c	430	78	22	3.1
Menlo Pk. F.D.	91	866	186	26	3.4
Monrovia	30	358	85	4	4.2
Montebello	120	413	86	13	4.0
Monterey Park	25	310	59	0	2.9
National City	24	296	48	1	2.3
Oakland	1,485c	6,121	1,716	698	4.5
Ontario	65	547	128	12	5.6
Oxnard	10	145	52	10	2.5
Palo Alto	89	632	181	47	7.2
Pasadena[1]	119c	969	384	117	3.7
Pomona	562ac	665	154	23	4.4
Redondo Beach	77	430	142	12	5.6
Redwood City	52	673	85	46	3.4
Richmond	229c	1,028	309	52	3.1
Riverside	81c	798	151	19	3.3
Sacramento	1,097c	2,528	618	268	4.5
San Bernardino	222c	1,164	253	89	4.0
San Diego	1,149c	4,182	1,401	203	4.4
San Francisco	...	11,773	3,081	2,046	4.1
San Gabriel	37	149	50	2	2.5
San Jose	291	1,612	238	137	2.5
San Leandro	81	608	96	13	3.5
San Mateo	238c	720	191	17	4.6
Santa Ana	84	932	203	88	4.5
Santa Barbara	200	696	184	32	4.1
Santa Cruz	70	326	92	18	4.2
Santa Monica	305	1,120	335	83	4.7
South Gate	95c	807	232	10	4.6
Stockton	282ac	1,566	300	90	4.2
Torrance	49	761	156	17	7.0
Vallejo	61c	716	152	113	6.6
Whittier	37	163	34	14	1.4
COLORADO					
Colorado Spr.	...	...	...	...	..
Denver	...	...	...	...	..
Greeley	29c	227	110	12	5.2
Pueblo	76	678	333	33	5.2
CONNECTICUT					
Bridgeport	338e	1,941	610	73	3.8
Bristol	73c	496	91	27	2.5
Danbury	35c	408	164	8	7.3
East Hartford	61c	480	97	20	3.3
Fairfield	117	273	23	3	0.8
Greenwich	126	1,083	153	4	3.8
Hamden[2]	183	492	32	19	1.1
Hartford	3,586c	2,488	531	217	3.0
So. Manchester	81	260	101	4	3.0
Meriden	170	475	184	30	4.2
Middletown	...	...	...	...	..
Milford	161	732	82	51	3.1
New Britain	188c	865	222	85	3.0
New Haven	607	2,470	766	156	4.7
New London	151c	389	89	23	2.9
Norwalk	235a	668	225	24	4.6
Norwich	44	251	83	15	3.5
Stamford	319	1,094	148	43	2.0
Stratford	103	495	98	8	4.1
Torrington	21b	247	59	8	2.1
Waterbury	473	1,670	460	96	4.4
West Hartford	190	569	81	19	1.8
W. Haven Twp	...	...	...	...	..
DELAWARE					
Wilmington	366	1,225	706	61	6.5

a. Estimated. b. Incomplete. c. Building and contents only. d. Insured loss only. e. Subject to change.
1. Fiscal year ended June 30, 1956. 2. Fiscal year ended September 30, 1956.

	Total Loss in 1,000's	No. Alarms	Bldg. Fires	False Alarms	Bldg. Fires / 1,000 Pop.
DISTRICT OF COLUMBIA					
Wash., D. C.	2,382	10,467	2,228	1,171	2.8
FLORIDA					
Daytona Beach	881	428	115	23	3.9
Ft. Lauderdale	222c	597	135	15	3.4
Gainesville	...	345	118	22	4.4
Jacksonville	961	3,323	735	265	3.7
Key West	222	251	41	20	1.9
Lakeland	19	426	148	25	4.8
Miami	569	3,343	723	107	2.9
Miami Beach	162	494	238	26	5.2
Orlando	137	713	56	38	1.1
Panama City	...	...	...	...	..
Pensacola	127	374	184	2	4.2
St. Petersburg	143c	1,734	276	14	2.9
Tallahassee	125c	723	117	25	4.3
Tampa	1,319a	3,568	802	223	6.5
W. Palm Beach	90	459	57	32	1.3
GEORGIA					
Albany	193	830	394	50	12.7
Athens	...	...	...	...	..
Atlanta	2,285	6,044	1,933	353	5.9
Augusta	186	834	387	64	5.4
Columbus	204c	771	365	104	4.6
Decatur	71	208	58	7	2.7
East Point	90	462	109	48	5.0
La Grange	52	346	105	17	4.2
Macon	161	787	360	125	5.1
Marietta	39c	362	146	51	7.1
Rome	96	582	224	36	7.6
Savannah	260	1,558	912	185	7.7
Valdosta	74	389	167	14	8.4
IDAHO					
Boise	312c	615	131	42	3.8
Pocatello	55c	294	142	15	5.5
ILLINOIS					
Alton	175	475	259	8	8.1
Aurora	480	896	247	...	4.9
Belleville	...	455	119	2	3.6
Berwyn	23	687	165	9	3.2
Bloomington	133c	1,147	208	34	6.1
Champaign	187c	339	167	18	4.2
Chicago	8,500	42,527	16,307	2,548	4.5
Chicago Hts.	315e	483	140	59	5.8
Cicero	344c	592	254	50	3.8
Danville	108	559	113	3	3.0
Decatur	319	719	386	11	5.7
East St. Louis	1,328	1,251	480	70	5.9
Elgin	867	452	85	14	2.0
Elmhurst	49	227	79	6	3.7
Evanston	325c	1,161	333	...	4.6
Freeport	195	...	...	...	..
Galesburg	88	414	106	9	3.4
Granite City	...	...	...	...	..
Harvey	148	538	81	20	3.9
Jacksonville	13	205	45	5	2.2
Joliet	188	1,344	278	47	5.3
Kankakee	504	742	50	6	1.9
Maywood	937	330	110	9	4.0
Moline	61	883	149	36	4.0
Oak Park	200	1,194	254	15	4.0
Ottawa	44	240	27	1	1.2
Pekin	68	181	86	3	3.9
Peoria	726	1,622	438	159	3.9
Quincy	139	595	112	11	2.7
Rockford	1,075	1,113	518	17	5.6
Rock Island	132	704	146	15	3.0
Springfield	1,143	1,240	568	34	7.0
Urbana	29	199	34	10	1.5
Waukegan	173	1,002	175	27	4.5
INDIANA					
Anderson	49	968	296	65	6.3
Bloomington	45	637	183	32	6.5
East Chicago	270c	696	231	81	4.3
Elkhart	39	1,865	161	36	4.5
Evansville	1,174	1,733	538	223	4.9
Fort Wayne	105	1,911	867	120	6.5
Gary	1,109	3,206	836	379	6.3
Hammond	82c	2,571	488	161	5.6
Indianapolis	1,311c	6,731	2,479	358	5.8
Kokomo	247	623	267	87	6.9
Lafayette	97c	577	48	21	1.4
Logansport	317	471	189	51	9.0
Marion	...	...	...	...	..
Michigan City	172	547	239	35	8.4
Mishawaka	51	459	97	51	3.0
Muncie	1,453c	980	364	48	6.2
New Albany	433a	474	219	45	7.5
Richmond	63	561	254	36	6.4
South Bend	186	2,052	553	225	4.8
Terre Haute	301	1,168	430	46	6.7
IOWA					
Ames	20c	233	83	...	3.6
Burlington	176	600	119	7	3.9
Cedar Rapids	288	867	491	27	6.8
Clinton	...	...	...	...	..
Council Bluffs	318	507	160	30	3.5
Davenport	574	1,158	440	109	6.0
Des Moines	2,587	2,711	682	131	3.9
Dubuque	69	816	308	16	6.2
Fort Dodge	479	372	63	22	2.5
Iowa City	44	187	69	0	2.5
Marshalltown	18c	223	95	15	4.7
Mason City	66	394	86	0	3.1
Ottumwa	226c	419	123	5	3.6
Sioux City	191	1,063	408	45	4.9
Waterloo	76	1,062	326	60	5.1
KANSAS					
Hutchinson	244	707	295	1	8.8
Kansas City	820	2,015	550	60	4.2

a. Estimated. c. Buildings and contents only. e. Subject to change.

	Total Loss in 1,000's	No. Alarms	Bldg. Fires	False Alarms	Bldg. Fires / 1,000 Pop.
KANSAS (Continued)					
Lawrence	156	351	191	8	8.2
Leavenworth	56	414	127	4	6.2
Pittsburg	25	598	85	9	3.4
Salina	59	683	190	16	7.3
Topeka	94c	1,233	367	101	4.7
Wichita	1,073	2,991	776	63	4.7
KENTUCKY					
Ashland	...	...	...	...	..
Covington	1,286	811	306	70	4.8
Lexington	1,630	2,076	337	180	6.2
Louisville	...	4,501	2,191	420	6.0
Newport	34	304	236	28	7.6
Owensboro	...	...	...	...	..
Paducah	254	1,090	257	43	..
LOUISIANA					
Alexandria	271c	391	187	44	5.4
Baton Rouge	262	1,521	434	241	3.5
Lafayette	...	...	...	...	..
Lake Charles	...	...	...	...	..
Monroe	206a	993	190	127	5.0
New Orleans	1,992c	5,561	1,519	338	2.7
Shreveport	1,598	1,935	485	104	3.9
MAINE					
Auburn	...	479	186	19	8.1
Augusta	37c	315	27	20	1.3
Bangor	111c	604	310	61	9.8
Biddeford	33	430	230	2	10.6
Lewiston	279	635	197	14	4.8
Portland	206a	1,493	163	112	2.1
South Portland	12	482	135	52	6.2
MARYLAND					
Baltimore	7,275	...	...	...	
Cumberland	...	381	197	31	5.2
Hagerstown	77	522	289	28	8.0
Montgo'y Cty.	657	2,209	855	36	5.2
MASSACHUSETTS					
Arlington	47c	1,006	259	48	5.9
Attleboro	42c	432	105	14	4.4
Belmont	52c	596	229	29	8.4
Beverly	119c	871	244	23	8.5
Boston	...	...	...	...	..
Braintree	70	864	167	44	7.2
Brockton	451	1,723	381	90	6.1
Brookline	159c	1,106	659	57	11.6
Cambridge	444	2,740	606	335	5.0
Chelsea	230	1,211	69	70	1.8
Chicopee	79	637	134	41	2.7
Everett	190c	1,067	134	76	2.9
Fall River	165c	1,501	427	152	3.8
Fitchburg	90b	...	...	...	..
Framingham	...	...	...	...	..
Gloucester	322	898	196	42	7.8
Haverhill	320c	1,484	104	94	2.2
Holyoke	172c	1,144	388	97	7.1
Lawrence	412c	1,763	307	94	3.8
Leominster	...	...	...	...	..
Lowell	...	...	...	...	..
Lynn	...	2,784	562	213	5.7
Malden	555a	1,290	139	60	2.3
Medford	...	...	...	...	..
Melrose	25c	782	29	48	1.1
Methuen	87	673	108	20	4.4
Milton	178	612	130	39	5.8
New Bedford	226	928	284	73	2.6
Newton	528e	1,847	497	80	6.1
North Adams	12	442	155	31	7.2
Northampton	169c	393	61	27	2.1
Peabody	211	628	154	10	6.8
Pittsfield	131e	896	194	38	3.7
Quincy	418	2,349	367	215	4.4
Revere	187	1,182	69	151	1.9
Salem	143	932	235	59	5.6
Somerville	1,304	1,742	303	152	3.0
Springfield	966ae	4,002	681	484	4.2
Taunton	66c	751	215	59	5.4
Waltham	186	644	175	50	3.7
Watertown	131c	1,205	130	40	3.5
Wellesley	18e	612	51	19	2.5
Westfield	238	630	93	19	4.4
W. Springfield	280e	481	156	34	7.6
Weymouth	96e	955	94	46	2.9
Woburn	...	...	...	...	..
Worcester	599e	4,109	977	526	5.3
MICHIGAN					
Ann Arbor	184	615	86	10	1.8
Battle Creek	287	936	167	115	3.4
Bay City	260	1,016	317	32	6.1
Dearborn	341	1,137	255	159	2.7
Detroit	8,974c	16,992	5,223	2,567	2.8
East Detroit	131	543	156	4	7.3
East Lansing	41	217	24	3	1.2
Ferndale	60	368	113	27	3.8
Flint	447c	2,054	1,163	143	7.2
Grand Rapids	376	1,674	273	106	1.6
Hamtramck	227	697	289	57	6.7
Highland Park	62	798	245	61	5.3
Jackson	236	683	465	60	9.1
Kalamazoo	113c	942	191	44	3.7
Lansing	206c	2,799	345	102	3.8
Lincoln Park	268a	623	146	110	5.0
Monroe	103	278	126	22	5.9
Muskegon	84	631	323	65	6.7
Pontiac	136	1,289	385	100	5.3
Port Huron	118	488	120	20	3.4
River Rouge	13	394	204	58	10.0
Royal Oak	131	836	313	101	6.7
Saginaw	331	1,668	256	69	2.8
Wyandotte	97	396	201	60	5.5

a. Estimated. b. Incomplete. c. Building and contents only. e. Subject to change.

	Total Loss in 1,000's	No. Alarms	Bldg. Fires	False Alarms	Bldg. Fires/ 1,000 Pop.
MINNESOTA					
Austin	99c	221	139	4	6.1
Duluth	800	1,356	511	77	4.9
Minneapolis	2,437	4,731	1,008	448	1.9
Rochester	563c	459	247	92	8.3
St. Cloud	38c	255	137	2	6.0
St. Louis Park	136	453	156	1	6.9
St. Paul	1,913ae	4,050	1,443	356	4.7
Winona	216	297	98	18	3.9
MISSISSIPPI					
Biloxi	212	367	95	7	2.6
Greenville	35c	599	228	14	7.6
Gulfport	...	520	103	25	4.6
Hattiesburg	140	458	205	9	7.0
Jackson	233	1,017	444	35	4.5
Laurel	176	385	122	20	4.9
Meridian	113	642	229	18	5.5
Natchez	52a	514	161	22	7.0
Vicksburg	156	389	60	13	2.2
MISSOURI					
Cape Girardeau	134	292	142	7	6.6
Columbia	75	404	111	4	3.5
Hannibal	124	209	76	...	3.7
Independence	41	641	183	66	5.0
Jefferson City	55c	375	132	7	5.3
Joplin	106	936	275	39	7.4
Kansas City	2,588	6,032	1,890	465	4.3
St. Joseph	152c	1,303	280	80	3.7
St. Louis	829a	8,516	2,549	1,249	3.0
Sedalia	112	395	174	...	8.6
Springfield	443	1,420	473	49	7.1
University City	249	662	51	18	1.3
Webster Groves	18c	258	23	9	
MONTANA					
Billings	...	...	...	...	..
Butte	...	...	...	...	..
Great Falls	169a	709	190	56	4.9
Missoula	457c	402	66	30	3.0
NEBRASKA					
Grand Island	88	374	183	7	8.0
Hastings	53	221	83	13	4.1
Lincoln	99	1,075	456	33	4.7
Omaha	1,553a	3,186	1,041	70	4.2
NEVADA					
Las Vegas	371c	823	137	11	5.6
Reno	121c	984	320	22	9.9
NEW HAMPSHIRE					
Concord	184c	503	164	16	5.9
Manchester	360bc	1,225	375	46	4.5
Nashua	225ac	568	249	6	7.2
NEW JERSEY					
Atlantic City	465	839	392	142	6.4
Bayonne	...	697	139	60	1.8
Belleville	74	544	108	54	3.4
Bloomfield	50	526	175	36	3.5
Camden	618c	1,760	430	184	3.4
Clifton	387	782	96	38	1.5
East Orange	332b	862	300	43	3.8
Elizabeth	...	1,098	105	61	0.9
Englewood	...	388	185	61	8.0
Fair Lawn	...	...	...	...	..
Garfield	...	...	...	...	..
Hackensack	39c	450	78	16	2.7
Hillside	32	305	178	0	8.5
Hoboken	225c	955	315	42	6.2
Irvington	57	394	231	27	3.9
Jersey City	656a	3,137	1,230	282	4.1
Kearny	520	517	101	40	2.5
Linden	279	539	172	10	5.7
Long Branch	...	...	...	...	..
Maplewood	20	280	111	21	4.4
Montclair	166	543	267	33	6.1
Newark	2,173	6,138	2,687	792	6.2
New Brunsw'k	289c	546	197	39	5.1
N. Bergen Twp.	394c	700	71	13	1.8
Nutley	22	365	76	14	2.8
Orange	51	514	212	28	5.5
Passa c	1,199c	735	125	36	2.2
Paterson	...	1,725	1,009	70	7.2
Perth Amboy	238	272	114	11	2.8
Plainfield	...	522	171	29	4.1
Rahway	103	361	77	8	3.6
Teaneck Twp.	93	780	140	10	4.1
Trenton	2,247	1,273	496	123	3.9
Union City	449c	1,014	221	32	4.0
Union Twp.	285	690	267	10	6.8
W. New York	469c	629	140	26	3.7
Westfield	...	311	172	2	8.1
West Orange	...	...	...	...	..
NEW MEXICO					
Albuquerque	668	1,149	475	114	4.9
Roswell	79	316	135	2	5.3
Santa Fe	86	209	102	11	3.4
NEW YORK					
Albany	...	...	...	...	..
Amsterdam	63	249	87	10	2.7
Auburn	113a	359	160	27	4.4
Binghamton	361a	793	187	36	2.3
Buffalo	1,751b	2,834	978	391	2.0
Cohoes	30	332	88	10	4.1
Elmira	119e	464	154	27	3.1
Endicott	63c	161	60	11	3.0
Freeport	141	457	178	11	7.2
Gloversville	113	279	92	9	3.9
Hempstead	...	...	...	...	..
Irondiqu't Twp	...	...	...	...	..
Ithaca	265e	199	71	8	2.4
Jamestown	53c	603	155	22	3.6
Kenmore	179	194	34	13	1.7
Kingston	129c	470	200	35	7.0

a. Estimated. b. Incomplete. c. Building and contents only. e. Subject to change.

	Total Loss in 1,000's	No. Alarms	Bldg. Fires	False Alarms	Bldg. Fires/ 1,000 Pop.
NEW YORK (Continued)					
Lackawanna	...	...	...	...	..
Lockport	96	407	118	27	4.7
Middletown	13	230	70	7	3.1
Mount Vernon	281	1,051	278	35	3.9
Newburgh	103	301	118	24	3.7
New Rochelle	273	739	292	30	4.9
New York	27,738	66,023	22,406	10,605	2.9
Niagara Falls	111	1,394	391	186	4.3
N. Tonawanda	187	166	49	39	2.0
Olean	24	246	26	14	1.1
Oswego	223c	191	95	17	4.1
Port Chester	76	226	122	8	5.1
Poughkeepsie	337	425	190	33	4.6
Rochester	788c	3,675	868	256	2.6
Rockville Ctr.	153	165	67	2	3.0
Rome	765c	432	117	29	2.8
Schenectady	...	...	...	...	..
Syracuse	1,698	1,597	728	147	3.3
Troy	240c	1,236	485	40	6.8
Utica	747c	843	312	59	3.1
Valley Stream	...	...	...	...	..
Watertown	188c	391	155	33	4.5
White Plains	230c	773	228	41	5.2
Yonkers	352	2,127	575	100	3.8
NORTH CAROLINA					
Asheville	194c	719	57	85	1.1
Burlington	93	...	...	...	..
Charlotte	379	2,465	787	408	5.9
Durham	155c	869	500	88	7.1
Fayetteville	226	764	277	68	8.0
Gastonia	84c	518	218	42	9.5
Goldsboro	20	...	227	...	10.6
Greensboro	241c	1,011	468	84	6.4
High Point	196c	640	307	49	7.7
Raleigh	581	1,068	382	160	5.9
Rocky Mount	73c	427	80	16	2.9
Wilmington	62a	541	317	79	7.1
Wilson	164c	389	196	67	8.6
Winston-Salem	1,688	1,312	366	79	4.2
NORTH DAKOTA					
Fargo	121d	573	131	25	3.5
Grand Forks	57	277	145	17	5.5
Minot	27	220	122	0	5.6
OHIO					
Akron	687	2,568	826	293	3.0
Alliance	38	202	72	47	2.8
Ashtabula	126	295	99	3	4.3
Barberton	55	314	92	53	3.3
Canton	174c	742	203	134	1.8
Chillicothe	332	446	64	19	3.2
Cincinnati	1,046	5,561	1,945	552	3.9
Cleveland	4,936a	9,874	2,848	1,362	3.1
Cleveland Hts.	106	1,141	217	11	3.7
Columbus	772	13,623	2,298	252	6.1
Cuyahoga Falls	32a	395	159	29	5.5
Dayton	567	5,224	584	393	2.4
East Cleveland	22	517	71	18	1.8
East Liverpool	19c	336	96	12	4.0
Elyria	407	246	128	4	4.3
Euclid	50	722	287	20	6.9
Findlay	113	358	127	2	5.3
Garfield Hgts.	...	...	...	...	..
Hamilton	112	1,456	263	57	4.6
Lakewood	110	231	69	34	1.0
Lancaster	293	1,140	100	6	4.2
Lima	323	631	283	28	5.7
Lorain	251	623	114	57	2.2
Mansfield	70c	799	301	62	6.9
Marion	81	586	178	17	5.3
Massillon	84c	251	123	19	4.2
Middletown	468	502	199	34	5.9
Newark	62c	690	23	30	0.7
Norwood	30	540	108	11	3.1
Parma	100	432	67	10	2.3
Portsmouth	39	336	135	24	3.7
Sandusky	89	662	153	8	5.3
Shaker Heights	234	478	298	2	10.7
Springfield	230	1,005	487	78	6.2
Steubenville	21c	355	65	50	1.8
Toledo	743	2,442	904	270	3.0
Warren	69	575	154	25	3.1
Youngstown	193c	1,515	405	127	2.4
Zanesville	319	347	176	46	4.4
OKLAHOMA					
Enid	98	550	225	28	6.3
Lawton	824	704	297	25	8.6
Muskogee	193c	897	139	35	3.7
Norman	31	375	55	1	2.0
Oklahoma City	984	4,960	1,011	216	4.2
Ponca City	122	416	136	10	6.7
Shawnee	16a	450	53	0	2.2
Stillwater	6c	...	...	...	..
Tulsa	1,194c	4,022	1,034	192	5.7
OREGON					
Eugene	434c	673	445	19	12.5
Portland	...	5,196	2,618	257	7.1
Salem	106c	462	316	8	7.4
PENNSYLVANIA					
Aliquippa	46	205	96	20	3.7
Allentown	294	551	315	37	3.0
Altoona	111	641	281	101	3.7
Bethlehem	169c	328	104	38	1.6
Butler	35	416	297	3	12.6
Chelt'h'm Twp	75	209	78	4	3.4
Chester	390c	703	270	72	4.1
Dunmore	21	112	17	9	0.8
Easton	276c	198	119	25	3.5
Erie	197	1,805	379	131	4.3
Harrisburg	300e	581	349	72	3.9
Haverford Twp	74	302	72	12	1.8
Hazleton	179	123	54	10	1.5
Johnstown	30	834	208	87	3.3

a. Estimated c. Building and contents only. d. Insured loss only. e. Subject to change.

	Total Loss in 1,000's	No. Alarms	Bldg. Fires	False Alarms	Bldg. Fires/ 1,000 Pop.
PENNSYLVANIA (Continued)					
Kingston	85	105	26	40	1.2
Lancaster	528a	419	237	52	3.7
Lebanon	32	155	82	6	2.9
Lower Merion	317	694	214	5	4.4
McKeesport	263	627	315	86	6.2
Mt. Lebanon T.	5a	280	98	1	3.7
Nanticoke	15	50	12	4	0.6
New Castle	...	...	...	...	..
New Kensing'n	25c	136	44	22	1.7
Norristown	...	...	...	...	..
Philadelphia	...	29,386	6,133	2,983	3.0
Pittsburgh	1,462	5,779	3,540	1,021	5.3
Pottstown	8c	...	...	9	..
Pottsville	29	87	43	3	1.8
Reading	...	...	...	...	..
Scranton	342c	901	324	119	2.6
Sharon	146c	...	267	13	10.1
Uniontown	70c	400	98	14	4.8
Upper Darby T.	207	507	202	3	1.1
Washington	184	222	143	25	5.5
Wilkes-Barre	96	522	146	62	1.9
Wilkinsburg	11	138	45	14	1.4
Williamsport	96	378	172	12	3.8
York	126c	319	167	32	2.8
RHODE ISLAND					
Central Falls	119c	349	95	22	4.0
Cranston	...	...	...	...	..
E. Providence	102	919	91	42	2.5
Newport	174	421	193	15	6.0
Pawtucket	355	1,696	301	179	3.7
Providence	2,099c	6,389	362	436	1.3
Warwick Twp.	172	2,060	192	86	4.5
Woonsocket	431	763	366	72	7.3
SOUTH CAROLINA					
Charleston	342ac	1,001	458	241	6.7
Columbia	407c	1,214	682	89	7.9
Greenville	159	906	348	102	6.0
Spartanburg	105	625	113	77	3.1
SOUTH DAKOTA					
Rapid City	64	366	46	6	1.8
Sioux Falls	316	556	169	11	3.2
TENNESSEE					
Chattanooga	1,209c	2,275	835	462	6.4
Jackson	392	444	253	21	8.4
Johnson City	97	399	179	7	6.5
Knoxville	227c	1,873	1,073	119	8.7
Memphis	2,168	5,808	2,058	162	5.2
Nashville	1,221c	2,875	986	260	5.7
TEXAS					
Abilene	324c	912	333	49	7.1
Amarillo	318c	1,205	190	81	2.6
Austin	712c	1,904	386	38	2.9
Baytown	187	338	102	10	4.5
Beaumont	398	1,279	443	48	4.7
Brownsville	...	...	...	...	..
Brownwood	...	...	...	...	..
Corpus Christi	222c	1,277	436	86	4.0
Dallas	4,743c	9,742	1,960	280	4.5
Denton	135c	376	105	9	4.9
El Paso	248c	1,604	491	125	3.8
Fort Worth	1,938	6,150	1,638	472	5.9
Galveston	127ac	1,099	273	209	4.1
Harlingen	59ac	311	100	0	4.3
Houston	3,959ac	8,072	1,253	911	2.1
Laredo	147	396	97	33	1.9
Longview	430c	1,470	946	0	3.9
Lubbock	688ce	1,177	483	64	6.8
Marshall	121c	587	73	12	3.3
McAllen	12	142	38	46	1.9
Midland	118cd	512	220	25	10.1
Odessa	125c	848	262	35	8.9
Orange	83c	423	114	33	5.4
Paris	129	617	162	7	7.5
Pasadena	102a	312	102	0	4.6
Port Arthur	191	544	80	60	1.4
San Angelo	...	...	...	...	..
San Antonio	1,554	5,036	1,501	246	3.7
Sherman	296c	516	224	45	11.2
Temple	83c	359	40	21	1.6
Texarkana	219c	728	129	17	5.2
Tyler	475c	947	300	10	7.7
University Pk.	117c	237	33	3	1.4
Waco	576c	1,167	497	40	5.9
Wichita Falls	50a	1,457	400	155	5.9
UTAH					
Ogden	458	1,429	219	96	3.9
Provo City	42	349	77	6	2.7
Salt Lake City	463	2,409	595	139	3.3
VERMONT					
Burlington	...	548	275	45	8.3
VIRGINIA					
Alexandria	79c	3,734	454	17	7.4
Arlington Cty	212	2,003	613	69	4.5
Charl'ville	269c	435	131	20	5.1
Danville	121	526	214	23	6.2
Hampton	338	801	243	22	4.0
Lynchburg	54	877	247	77	5.2
Newport News	685	836	345	89	8.3
Norfolk	901	4,042	1,023	498	5.4
Petersburg	93	816	329	72	9.4
Portsmouth	320	1,160	321	97	4.5
Richmond	932	3,558	2,096	284	9.1
Roanoke	495	1,343	...	149	..
Warwick	31	653	345	14	8.7
WASHINGTON					
Bellingham	...	...	...	...	..
Bremerton	49	402	245	31	8.8
Everett	792	791	214	27	6.3
Longview	85	323	126	28	6.1
Seattle	...	...	...	...	..

a. Estimated. c. Buildings and contents only. d. Insured loss only. e. Subject to change.

	Total Loss in 1,000's	No. Alarms	Bldg. Fires	False Alarms	Bldg. Fires/ 1,000. Pop.
WASHINGTON (Continued)					
Spokane	863c	2,501	1,372	200	8.6
Tacoma	367	...	...	...	..
Vancouver	184	477	297	16	10.6
Walla Walla	118c	548	268	29	11.2
Yakima	152c	633	280	14	7.3
WEST VIRGINIA					
Bluefield	226c	171	42	11	2.0
Charleston	531	863	267	193	3.7
Clarksburg	60c	1,120	142	...	4.5
Fairmont	29	839	125	1	4.3
Huntington	602c	1,312	426	171	4.9
Morgantown	1,004	118	9	8	0.4
Parkersburg	301a	274	93	16	2.3
Weirton	54	195	54	2	2.2
Wheeling	149	2,219	229	32	3.9
WISCONSIN					
Appleton	156	335	71	37	2.1
Beloit	58	525	168	53	5.7
Eau Claire	171a	433	167	58	4.7
Fond du Lac	78	335	155	33	5.2
Green Bay	248	994	268	62	5.1
Janesville	243	587	61	33	2.5
Kenosha	296	1,031	295	30	5.5
La Crosse	141	739	101	27	2.1
Madison	60e	772	352	53	3.7
Manitowoc	147	470	159	35	5.8
Milwaukee	2,336	10,595	1,989	447	3.1
Oshkosh	89	534	206	23	5.0
Racine	201	2,137	217	66	3.1
Sheboygan	47	397	202	4	4.8
Superior	329a	601	306	26	8.7
Waukesha	...	...	...	...	..
Wausau	44	514	242	23	8.0
Wauwatosa	47	718	135	11	4.1
West Allis	42	469	168	11	3.9
WYOMING					
Casper	143	421	215	19	6.4
Cheyenne	62	308	103	12	3.2

1956 FIRE LOSSES, CANADIAN CITIES

	Total Loss in 1,000's	No. Alarms	Bldg. Fires	False Alarms	Bldg. Fires/ 1,000 Pop.
ALBERTA					
Calgary	697	1,777	780	191	5.8
Edmonton	1,268ac	1,743	432	222	2.7
Lethbridge	29	323	44	18	1.9
BRITISH COLUMBIA					
Burnaby	562	789	132	19	2.2
New Westmin'r	859	448	100	55	3.3
Saanich	31	652	220	20	9.2
Vancouver	2,849	6,369	2,591	168	4.1
Victoria	414	861	513	95	10.1
MANITOBA					
Brandon	106	301	130	19	6.1
St. Boniface	175	407	260	48	9.9
Winnipeg	...	...	...	...	..
NEW BRUNSWICK					
Moncton	...	...	...	...	..
Saint John	252a	1,352	822	111	13.0
NOVA SCOTIA					
Glace Bay	...	...	...	...	..
Halifax	451c	1,756	942	107	7.7
Sydney	...	...	...	...	..
ONTARIO					
Brantford	211c	454	244	8	6.7
Chatham	127c	219	98	2	4.5
East York Twp	32c	305	45	6	0.7
Etobicoke	151	803	365	70	7.9
Fort William	70c	536	308	40	10.1
Galt	66	270	186	29	8.1
Guelph	28	463	278	2	10.7
Hamilton	1,276	2,300	560	127	2.9
Kingston	102	695	316	70	8.8
Kitchener	577	406	264	3	6.1
London	298c	905	205	23	2.2
Niagara Falls	12c	200	124	26	6.0
N. York Twp.	1,030a	1,033	433	72	6.9
Oshawa	218c	456	220	...	5.4
Ottawa	1,935	2,359	1,627	6	7 4
Peterboro	115ce	713	67	30	1 9
Port Arthur	341	681	92	60	2.9
St. Catharines	200c	503	355	14	9.4
Sarnia	299c	378	...	...	..
Sault Ste. Marie	60ac	509	303	20	9.2
Scarboro Twp.	377	1,315	229	101	3.8
Sudbury	91c	434	105	0	2.1
Timmins	40	614	56	30	2.1
Toronto	2,877c	6,877	2,681	891	4.0
Windsor	700a	1,452	603	143	5.0
York Twp.	221c	763	225	52	2.3
QUEBEC					
Chicoutimi	56c	289	...	25	..
Hull	574	886	393	153	9.0
Jonquiere	...	408	207	83	8 1
Lachine	282	486	42	63	1.4
Montreal	7,202e	14,023	2,550	4,202	2.2
Outremont	26c	235	...	13	..
Quebec	1,316	2,258	1,054	532	5.1
Shaw'gan Falls	53	263	58	25	1.5
Sherbrooke	...	...	...	...	..
Three Rivers	228	521	339	62	6.4
Verdun	...	...	...	...	..
Westmount	84c	346	88	32	3.2
SASKATCHEWAN					
Moose Jaw	38	447	25	67	1.0
Regina	272	1,073	556	244	8.0
Saskatoon	304c	1,252	451	84	8.5

a. Estimated. c. Buildings and contents only. e. Subject to change.

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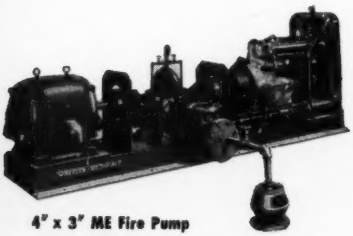

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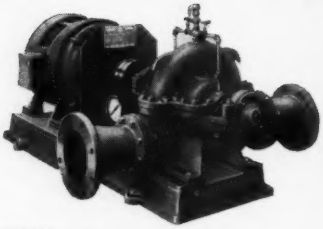

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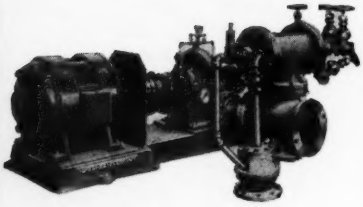

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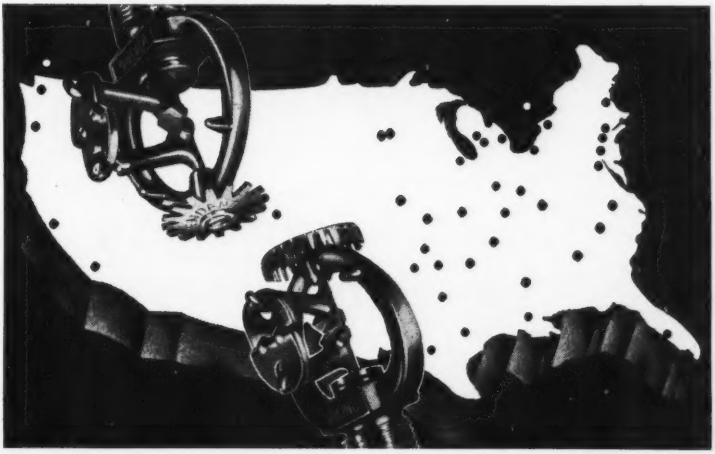

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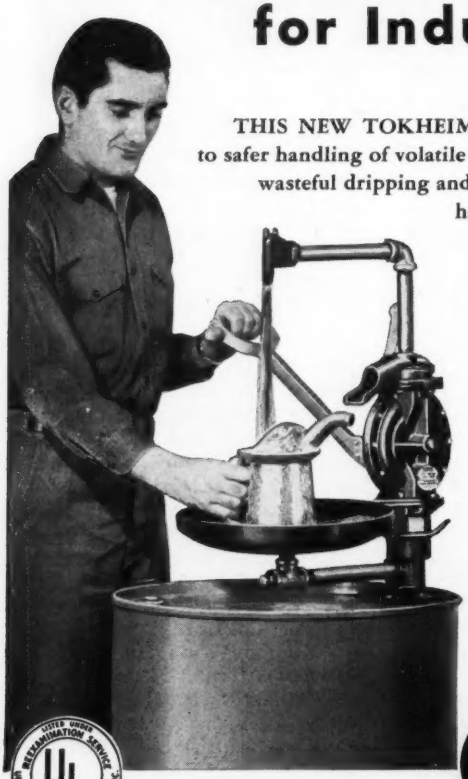

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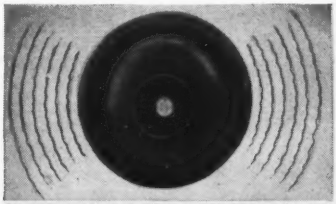
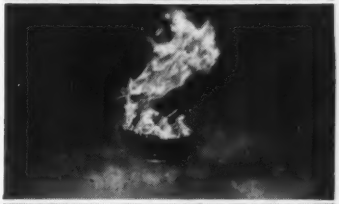
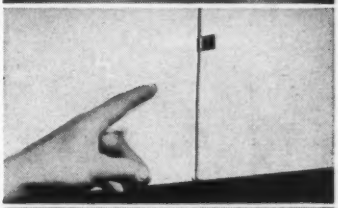


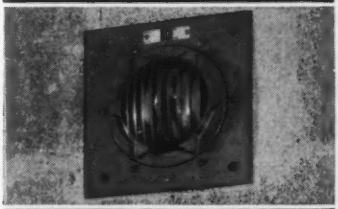


AT THE FIRST HOT BREATH OF FIRE



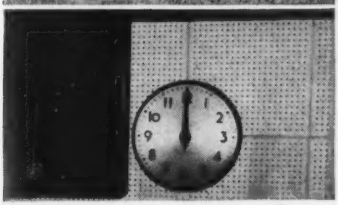
KIDDE'S ATMO ALARM SYSTEM

(using rate-of-temperature-rise tubing)



TRIGGERS ALARM AT FIRE AREA

(outside building or at local fire department)



GIVES FIRE LOCATION AT ANNUNCIATOR PANEL

(usually at manned telephone switchboard)

Save priceless lives, save valuable buildings with Kidde's Atmo Fire Alarm System. This wide-area automatic fire detecting and warning system sounds alarm almost the moment fire starts. Ideal where life protection and early fire warning is essential, the Kidde-Atmo system operates independently of regular power sources, gives protection even if outside power fails. What's more, the system can close doors, shut off fans, motors, blowers. Is automatically self-resetting after use or test. Write today for Kidde's Atmo Alarm System booklet.

Kidde—Atmo

FIRE DETECTION

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451 Main Street, Orange, N. J.

A Subsidiary of

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safety is paramount

– in every country

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SAFETY has about the same connotation throughout the Petroleum Industry of the World– whether it be in the steaming jungles of Indonesia, the burning sands of the Middle East, or on the endless plains of TEXAS.

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Such experience includes complete automatic sprinkler installations, both wet and dry pipe type, deluge systems and special hazard systems involving fog, foam and CO_2 systems. The individual demand for devices can be met and supplied in the form of:

- SPRAY SPRINKLERS, BOTH UPRIGHT & PENDENT TYPE
- DRY PENDENT SPRINKLERS
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- WINDOW & CORNICE SPRINKLERS
- SPRAY NOZZLES, AUTOMATIC & OPEN TYPE
- ALARM CHECK VALVES (MODEL E)
- DRY PIPE VALVES (MODEL F)
- AUTOMATIC AIR PRESSURE DEVICES (FOR DRY SYSTEMS)
- DETECTOR CHECK VALVES
- FUSIBLE LINKS
- UNDERWRITERS APPROVED FIRE HYDRANTS
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- GATE VALVES & CHECK VALVES
- FIRE EXTINGUISHERS (ALL TYPES)
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GLOBE AUTOMATIC SPRINKLER COMPANY

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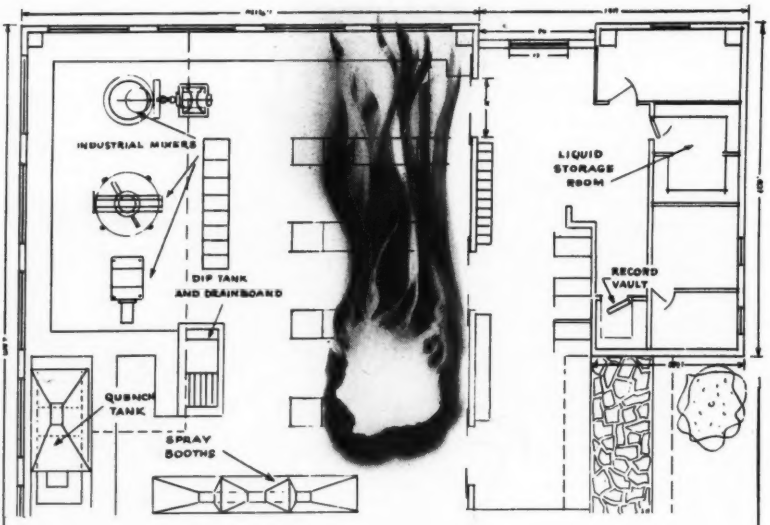
OFFICES IN PRINCIPAL CITIES



Where will FIRE start in your plant?

Whatever the hazard, dip tanks, record storage vaults, spray booths, Kidde's carbon dioxide fire extinguishing system protects your plant 24 hours a day, gives you the fastest, safest fire protection ever made! Product of more than thirty years' experience, the Kidde system boasts more features than any other make on the market today. Features like:

All operating parts completely enclosed for safety.
No clumsy triggering methods or falling weights.
Self-contained; no outside power needed.
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Fast-acting, clean carbon dioxide does the job that no other extinguishing agent can do: snuffs fire out in seconds, then vanishes into thin air. Won't harm valuable machinery, leaves no mess to clean up. Write for Kidde's pressure operated carbon dioxide fire extinguishing systems booklet today.

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Walter Kidde & Company, Inc.
451 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd., Montreal—Toronto

Champion Fire Fighters

COMPRESSION TYPE FIRE HYDRANT

MH

Above all else, M & H Fire Hydrants are reliable and dependable fire fighting equipment. They deliver when the need arises, if there is water in the mains. Their high flow efficiency is due to an unobstructed, large waterway which has the same diameter its entire length.

Dry top, dry barrel when not in use, eliminates danger of damage by freezing. Operating parts are bronze or bronze bushed. Easy to lubricate.

Manufactured according to A. W. W. A. standard specifications or Underwriters and Factory Mutuals approved; in conventional model, traffic model or flush-type model; sizes 4¼, 4½, 5¼ and 6¼. For complete information, address

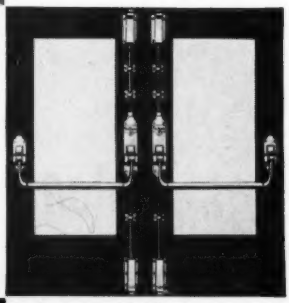
M&H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

SUBSIDIARY OF W WALWORTH

Get your exits

ready for increased traffic

Call in your



Von Duprin
"EXIT SPECIALIST"

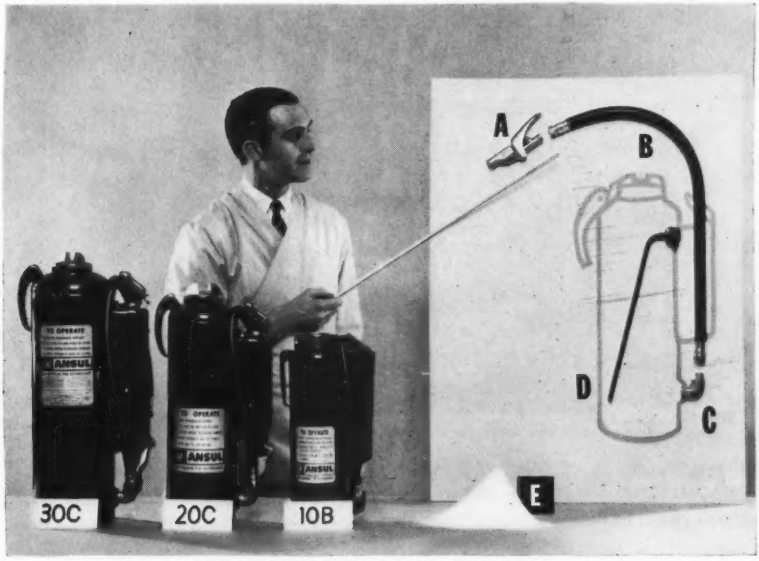
● Increased production for your plant means more employes, more traffic, more need than ever for safe, dependable exits. Call in your Von Duprin "Exit Specialist" for a free survey of your exit requirements. From actual experience, he can recommend the right Von Duprin exit devices to give you the greatest safety and service. Von Duprin is the most complete line of approved exit devices. From this one line, you can meet *all* your present and potential exit hardware needs. If you don't know the name of your nearest "Exit Specialist," write Von Duprin.

FREE Reserve a showing of Von Duprin's 20-minute sound movie, "Safe Exit." Build a lively safety program around this interesting public service film. Write for a booking.

VONNEGUT HARDWARE CO. • VON DUPRIN DIVISION • INDIANAPOLIS

Von Duprin Fire and Panic **EXIT DEVICES**

THE SAFE WAY OUT!



A Nozzle redesigned for more uniform fire coverage, faster fire put-outs. **B** Hose with larger diameter gets more dry chemical to fire faster. **C** Elbow enlarged to accelerate flow of dry chemical. **D** Gas tube redesigned for more uniform gas pressure distribution. **E** PLUS-FIFTY B dry chemical gives improved performance over a wider temperature range.

Important design improvements in these Ansul Extinguishers give you more fire fighting power at no increase in price. Three years of research and more than 2000 fire tests turned up some significant new information on dry chemical extinguishment. Ansul engineers were able to design these findings into three new extinguisher models, the 10B, 20C and 30C. Result, greatly increased fire fighting power. All Ansul equipment is backed by a five-year warranty. This is the best way we know to say Ansul fire extinguishers are the finest of their kind made anywhere.

The Ansul Chemical Co., Marinette, Wisconsin

ANSUL

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HEAVY DUTY ALARM BELLS
GONGS and BUZZERS
Weatherproof Watertight

Weatherproof —
Sizes 3", 4", 6", 8", 10", 12"
DC—6—220 V. · AC—12—220 V.

Watertight —
Sizes 3", 4", 6", 8", 10", 12"
DC—6—220 Volt · AC—12—220 Volt
60 Cycles, 110—220 Volt, 25 Cycles

3 TYPES OF
UNDERDOME BELLS
OPEN PIGTAIL • WEATHERPROOF • E-Z MOUNT
Sizes 6", 8", 10". Cast aluminum housing
Hot Pressed Steel Gong Shell
Single Stroke and Vibrating Types
Voltages are the same as Neck Type

Special Windings on request.

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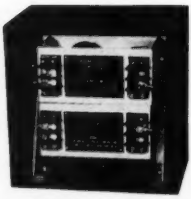
Write for Catalog Material and Prices!

AUTOMATIC BATTERY CHARGER, High and Low Current

The unit is designed for use on any storage batteries not subject to heavy drains. It will trickle charge the battery indefinitely because of its automatically decreasing rate of charge.

For use with six cells (12 volts). Automatically controlled by saturable reactor. Continuous output one ampere. 22.5 watts, 118 volts, 60 cycles. 3% Regulation. 9" x 9" x 6" — 14 B & S gauge steel wall cabinet. 15¼ lbs. U.L. Approved. No moving parts.



MODEL BC-12

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CENTRAL OFFICE and LOCAL FIRE ALARM DEVICES
• automatic alarm devices • sprinkler alarm and supervisory devices • burglar alarm devices and accessories. DYNALARM (sound detection for both reverberant and non-reverberant vaults).

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Contains Valuable Special Hazard List!

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Fill in the coupon below and we'll rush the Special Fire Hazard booklet to you by return mail.

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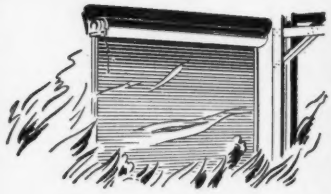
"Akbar"—the famous Kinnear Rolling Fire Door



Automatically BLOCKS the Spread of fire

Safety Features Give Building Occupants EXTRA Protection

You get *positive, automatic* fire protection at doorways, windows and other openings with Akbar Fire Doors. They're *pushed* downward by a strong spring . . . *controlled* in downward speed by a special safety device . . . and operable in emergency *after* automatic closure. Coiled out of the way overhead when not in use, they lower quickly into place when fire threatens, cutting off drafts and confining flames to small areas. Approved by Underwriters' Laboratories, they are built in any size. Kinnear Rolling Fire Doors can also be equipped for daily service with motor or manual operation. (Non-labeled Kinnear Rolling Doors are preferred for service use where maximum fire protection is not required.) Write!

The KINNEAR Manufacturing Co.

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SAVING WAYS in DOORWAYS

KINNEAR ROLLING DOORS

VICTAULIC

METHOD OF PIPING

VICTAULIC COUPLINGS *

Styles 77, 77-D for standard applications. Simple, fast to install—sturdy and reliable. Sizes ¾" to 30". Style 75 Light-Weight Couplings for light-duty applications. Sizes 2", 3", 4". Additional styles for cast iron, plastic and other pipes. Sizes through 60".

ROUST-A-BOUT COUPLINGS *

Style 99 for plain or beveled end pipe. Best engineered, most useful plain end joint on the market. Simple, husky — easy and fast to install. Takes strong bull-dog grip on pipe. Sizes 2" to 8".

VICTAULIC FULL-FLOW FITTINGS

Complete line of Elbows, Tees, Reducers, Laterals, etc. — to fit all Victaulic Couplings. Streamlined for top efficiency, easy to install. Sizes ¾" to 12".

VIC-GROOVER TOOLS

Handy, on-the-job grooving tools that do the job in half the time. Light weight, easy to handle — operate manually or from any power drive. Automatic groove position and depth. Sizes ¾" to 8".

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Proven for 26 years on both wet and dry Fire Protection Systems. Standard with most major sprinkler companies for bulk-run and cut-in piping. Victaulic Couplings are installed in *less than one-half the time* required for other standard pipe joints.

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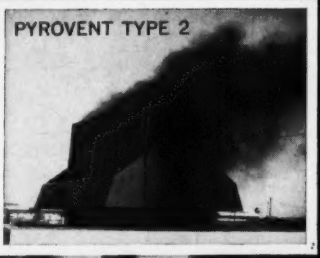
COMPLETE
Protection...

Include WASCOLITE PYRODOMES! Smoke, flames, explosive gases are vented automatically for complete protection. WASCOLITE PYRODOMES and PYROVENTS make sprinklers doubly effective in reducing dangerous temperature build-ups on roof decks. Your fire protection is assured with WASCOLITE PYRODOMES and PYROVENTS!



For information write:

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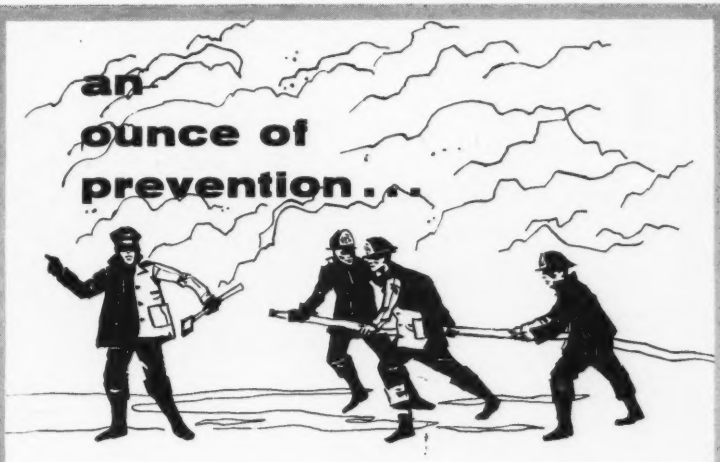

Recall the old saying "An ounce of prevention is worth a pound of cure". Lexsuco Fire-Retardant Roof Constructions can be the "ounce of prevention" for your building. A Lexsuco Roof eliminates flammable asphaltic materials from between the roof deck and insulation. It will not feed a fire, will not spread a fire and eliminates dense, black smoke, making fire-fighting possible. Make the building you build or insure fire-retardant with Lexsuco Roof Constructions.

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FLAMMABLES OPERATIONS GUIDES

for Prevention of Fires from Unloading and Transferring through to Washing, Cleaning, Swabbing and Disposal

Equipment Selection Guide—a compact, concise illustrated chart containing a selection of various plant operations and the equipment suggested for fire prevention.
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Protectoseal provides the ONE complete source of APPROVED Fire Preventive Equipment for ALL Flammables Operations with over 100 specialized containers and devices for protection in every department and every activity all through the plant.

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Fill in coupon and attach to company letterhead.

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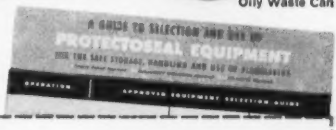

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Send "A Guide to Selection and Use of Protectoseal Equipment for Safe Storage, Handling and Use of Flammables." Also send the complete catalogs checked below:

☐ Safety Can Catalog ☐ Drum Storage Catalog ☐ Vent and Fitting Catalog containing Venting Fundamentals

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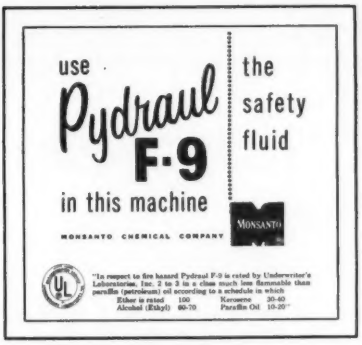
WASHINGTON, D. C.	**FEDERAL ENGINEERING CO., INC.** 1004 Sixth Street, N.W.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F-9
in this machine
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the
safety
fluid
MONSANTO
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Ether is rated 100 Kerosene 20-40
Alcohol (Ethyl) 60-70 Paraffin Oil 10-20"

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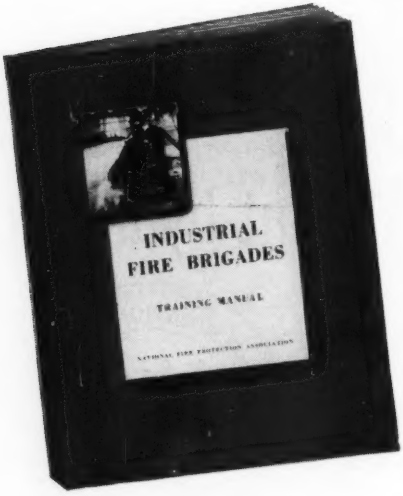
NFPA

INDUSTRIAL FIRE BRIGADES Training Manual



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160 pages and 385 illustrations

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- Rescue Work
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- Fire Fighting

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NATIONAL FIRE PROTECTION ASSOCIATION
INTERNATIONAL
60 Batterymarch St., Boston 10, Mass.

RELIABLE SPRAY SPRINKLER

- Greater Coverage!
- Lower Ceiling Temperatures!
- Faster Cooling of Hot Fire Gasses!
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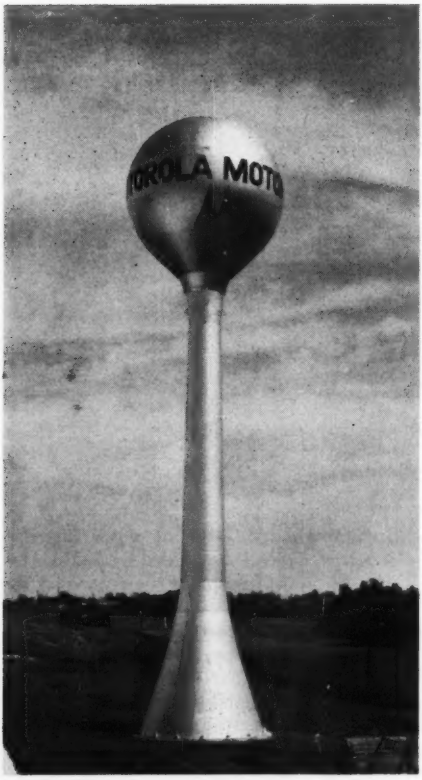
Incorporating the new principle of water distribution, the Model "C" Spray Sprinkler is another example of Reliable's leadership in new product design. All Reliable Sprinkler Devices are the assurance of the ultimate in fire protection . . . and have been protecting life and property for over 30 years! Reliable Sprinkler Devices are distributed . . . installed and serviced by Reliable's chain of licensed representatives located throughout the United States, Canada and foreign countries. A Reliable representative is as near as your phone . . . Call him for a system designed to your specific needs!

Constant Fire Protection That's Always "Reliable"!

THE RELIABLE AUTOMATIC SPRINKLER CO. INC.

HORTON WATERSPHERE

Serving Sprinkler System Nets 80 Per Cent Insurance Saving



At the Quincy, Illinois, plant of Motorola, Incorporated, an 80 per cent insurance premium reduction was realized through the installation of a sprinkler system and a Watersphere. The savings earned through lower insurance premiums will pay for this fire protection system in approximately six years.

The Horton Watersphere has a capacity of 100,000 gallons and a height to the bottom capacity line of 100 feet. It provides a source of water supply to supplement the city mains. The sprinkler system is composed of 1,632 sprinkler heads and protects a building area of 183,000 square feet.

Motorola's Quincy plant was established in 1948, and is one of the Company's nine manufacturing plants. Home, portable, clock and automobile radios and phonographs are manufactured at the Quincy plant.

Waterspheres are available in capacities from 25,000 to 250,000 gallons. In addition ellipsoidal bottom elevated tanks in capacities from 15,000 to 500,000 gallons are also available.

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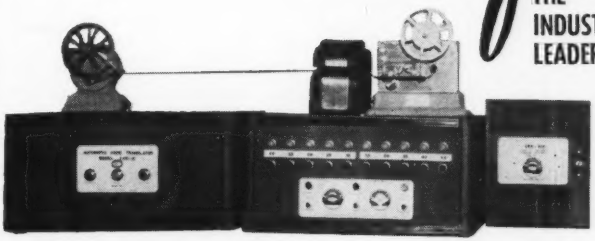
DESTRUCTIVE FIRES CAN BE PREVENTED

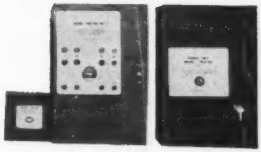
in Warehouses, Factory and Office Buildings

by *Notifier*

THE INDUSTRY'S LEADER



CLASS "A" PROPRIETARY SYSTEM
FULLY AUTOMATIC
FIRE DETECTION
SPRINKLER SUPERVISION
AND
COMPULSORY WATCHMAN'S TOUR



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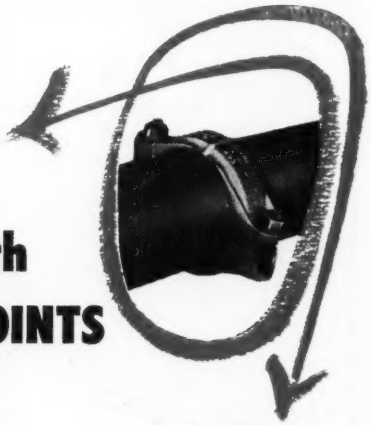
NOTIFIER Automatic FIRE ALARM

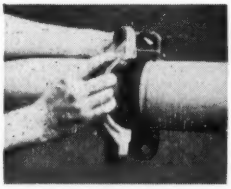
Couple Pipe the Easy, Low Cost Way with New G-B GRUVAJOINTS



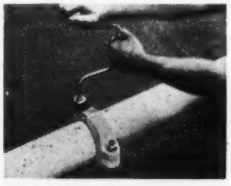
Now you can save up to 25% when connecting pipe for bulk runs and risers. Yes, contractors are saving money every day when they use new lightweight Gruvajoints. There's no flanging, no threading, no welding, and there's no need for heavy chain tongs or pipe wrenches. Gruvajoints are truly the modern way to couple pipe. Write today for free illustrated brochure on G-B Pipe Coupling Products. Gruvajoints are now available in 2", 2½", 3", 4", 5", 6" and 8" sizes.

Install Gruvajoints in three easy steps

Grease gasket and center over pipe ends.



Lay housing halves into grooves and insert bolts.



Tighten the two nuts equally.

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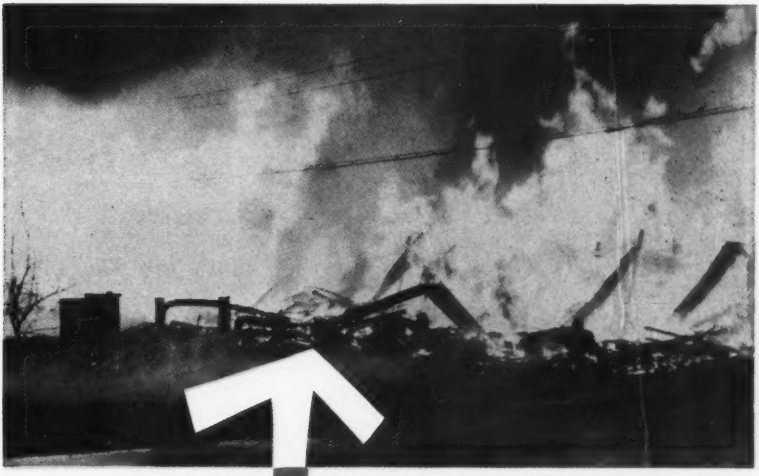
Underwriters' Laboratories, Inc.
File EX 1741A and B

APPROVED by
Factory Mutual Engineering Division
Report Serial No. 13097

GUSTIN-BACON
manufacturing company
210 W. 10th St. Kansas City, Missouri

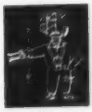


this was so unnecessary

A Blaw-Knox Automatic Sprinkler System could have prevented it

Most uncontrolled fires are unnecessary. The damage in property destroyed, plants lost, inventories wiped out, records ruined, and businesses shut down can never be recovered. A Blaw-Knox *Automatic* Sprinkler System can stop fires at their origin, minimize damage to a small area, and pay for itself in a few years by savings in reduced insurance premiums.

"Little Joey Sprinkler" always on the job.



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Automatic Sprinkler Department
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CENTRAL STATION SIGNALS, INC.

Manufacturers of all kinds of approved devices used in Central Station Systems or Class 'A' or Class 'B' Proprietary Fire Alarm Systems, either automatic or manual.

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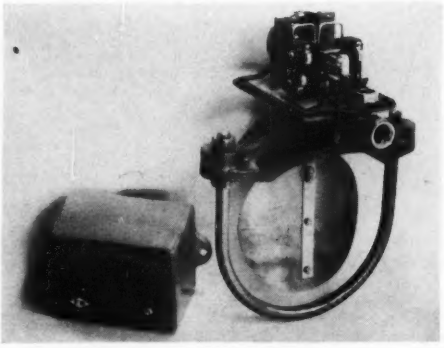


Model PRS-1

Sprinkler

Waterflow Alarm

This device is approved by Factory Mutual Laboratories and Underwriters' Laboratories, Inc.

- This device is also made as Model PRT-1, a coded waterflow transmitter.

5-inch size shown above. To install simply drill 2-inch hole in pipe.

- Also made in explosion proof models.
- Made in all sizes from 2½" to 8".
- Has instantly recycling pneumatic retarding device, which prevents false alarms.
- Has enclosed electrical contacts for any voltage not exceeding 15 amp. 125 volts, A.C. and ½ amp. 125 volts, D.C. Operates on all water pressures or surges.

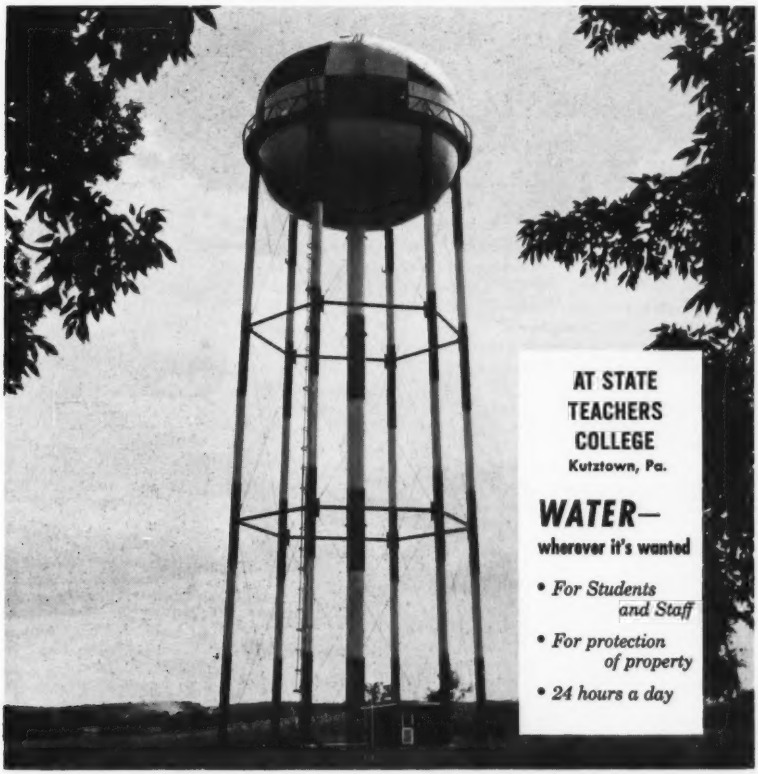
Size is 1⅝" x ⅝"

Tempo-Set Model A Fire Detector

Underwriters' Laboratories, Inc. Approved.

- Self restoring and can be heat tested.
- Electrical contacts are silver or gold and are enclosed.
- Very reasonable price.

- Tempo-set Model A is approved in either open or closed circuit and the temperature ratings are 135 and 200 degrees.
- Approved spacing is 20' x 20'.
- Electric ratings are 125 volts 1 ampere, A.C. or 24 volts 0.5 ampere D.C. or less.



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RAISLER CORPORATION, 129 Amsterdam Ave., New York 23

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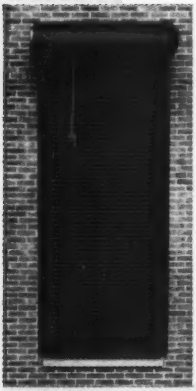
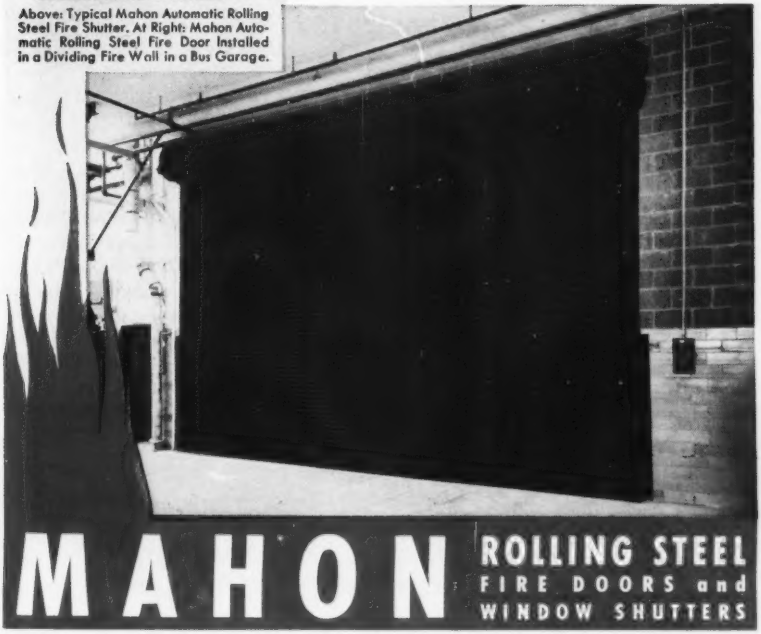
Automatic Rolling Steel
FIRE DOORS *and* WINDOW SHUTTERS PREVENT SPREAD *of* FIRE!



You need good automatic fire doors in fire walls, corridors, and vertical shafts . . . in some cases automatic rolling steel window shutters are necessary to protect your building and its contents from fires which may originate in nearby buildings. Many, many cases are on file which confirm that timely action of automatic rolling steel fire doors and window shutters have confined a fire to its point of origin and permitted its being extinguished with comparatively small damage. Make a survey of your building now, and don't delay action. You will find a Mahon Automatic Rolling Steel Fire Door or Window Shutter to meet each of your requirements—all bear the Underwriters' Label. These automatic fire doors may be operated manually or mechanically in every day use. If a fire should break out while they are in the open position, the automatic mechanism will close the door, cutting off drafts and preventing the spread of the fire. See Sweet's Files for complete information, or write for Catalog G-57.

THE R. C. MAHON COMPANY • Detroit 34, Michigan
Branch Offices in New York and Chicago • Representatives in Principal Cities
Manufacturers of Standard and Underwriters' Labeled Automatic Rolling Steel Fire Doors and Window Shutters; Underwriters' Rated Metaklad Fire Walls; Insulated Metal Curtain Walls; Electrified M-Floors; Steel Roof Deck; Acoustical Long Span M-Decks; and Acoustical and Troffer Forms.

Above: Typical Mahon Automatic Rolling Steel Fire Shutter. At Right: Mahon Automatic Rolling Steel Fire Door Installed in a Dividing Fire Wall in a Bus Garage.



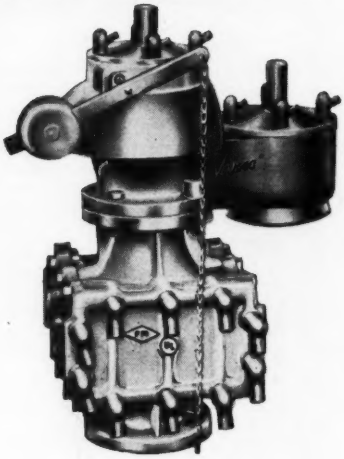
EXTRA SAFETY

at LOW COST...

"Varec"

FLAME ARRESTERS

in combination with your VENT VALVES



Flame Arrester Unit listed by UNDERWRITERS' LABORATORIES Approved by Associated Factory Mutuals Laboratories and other governing agencies.

"Varec" Fig. No. 5800 Vent Unit consisting of "Varec" Conservation Vent Valve in combination with "Varec" Flame Arrester.

The larger area of the multi-plate Flame Arrester bank, greater flow per minute through the Flame Arrester passageways are the "plus" factors to give you extra safety when you install "Varec" Conservation Vent Units. Protection against entry of flame through the venting device is certain when "Varec" Flame Arresters are used. Excessive pressure or vacuum is avoided by use of the "Varec" Vent Valve. The combination unit gives you complete security against the major hazards of flammable liquid storage yet average installation approximately 1/10 of 1% of your investment in tank and product. Consult your nearest "Varec" representatives or write factory.

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Perhaps the use of a new type of raw material can help you lower cost or increase sales. But if that material is a flammable liquid, be sure your program for fire protection meets your new requirements. Ask National Foam for helpful recommendations!

NATIONAL FOAM System, Inc.
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NATIONAL FOAM FIRE PROTECTION SYSTEM

The only company exclusively engaged in the design, development and manufacture of foam fire protection equipment and chemicals.

A single match could close your doors for good!

A carelessly discarded match can hang a "Closed" sign on your business — *in a matter of minutes!* Any fire can get out of control — fast — unless barricaded and stopped by a Pyrene C-O-Two *safety-engineered* extinguisher. Call your local Pyrene-C-O-Two distributor today! He carries a complete line of quality extinguishers, systems, brass goods, hose and accessories. Or write to:

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SEVERE TESTS* PROVE STARGARD SUPERIORITY

No sprinkler was ever subjected to more severe tests than the new "Stargard" Automatic Sprinkler.

* This is the second in a series of advertisements describing these tests.

☑ CORROSION
☑ PAINT LOADING
☐ ROUGH USAGE
☐ OVERALL STRENGTH

PAINT LOADING TEST #2

The sprinklers were given two heavy coats of both resin oil and lead type paint to determine susceptibility to failure under extreme paint loading conditions. The painted sprinklers were then subjected to constant temperature of 125° in an electric oven for ten days to harden and cure the paint.

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By this test we do not imply it is desirable to permit sprinklers in service to become paint loaded. Section 650 of NFPA No. 13 should be followed.

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For further particulars, write today.

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SURE SIGN OF SAFE GAS VENTING

It will soon appear on vented gas appliance installations in your district. It means that all venting was designed and installed in accordance with the Metalbestos "Safety System." This new System is based on an established, field-proven scientific principle governing vent design and installation procedure.

The Metalbestos "Safety System" Seal quickly assures building inspectors and utility representatives of safe, positive gas venting . . . without draft hood spillage or internal condensation.

For a complimentary copy of the new "Safety System" Installation Guide, contact your nearest Metalbestos representative or write Dept. T-4.

STOCKED BY PRINCIPAL JOBBERS IN MAJOR CITIES. FACTORY WAREHOUSES IN AKRON, ATLANTA, DALLAS, NEWARK, DES MOINES, CHICAGO, NEW ORLEANS, LOS ANGELES

Gamewell offers a new concept to fire protection engineering...

FLEXALARM Fire Alarm System Planning Guide

Flexalarm F249 Planning Guide includes data on (1) Basic System plans and their integration; (2) Major Components and their function; (3) Fifty-two systems which answer specific requirements; and (4) Definitions of terms used in the fire alarm industry.

F249 is uniquely arranged for quick reference and will be supplemented on a periodic basis with additional data on fire alarm systems.

Audible Signals

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Central Units ... integrating extensive combination of functions, including annunciating, battery standby, automatic detection, coded stations and special drill and test features.

Here's a new and simplified approach to the design, application and specification of interior fire alarm systems — the Gamewell Flexalarm Catalog No. F249. It is available to you without charge.

Over 96 pages of information and technical data on the Flexalarm System have been compiled by Gamewell. It includes suggested systems and layouts, gives you a complete one-source reference for specifying the best possible protection against the hazards of fire.

Send for Flexalarm F249 Now!
Save valuable time, make sure your plans include the most modern fire alarm systems available. F249 can be used to write a complete specification or as the basis for special systems as required. Request your copy from: The Gamewell Company, Dept. BB, Newton Upper Falls 64, Massachusetts.

GAMEWELL

THE GAMEWELL COMPANY
Newton Upper Falls 64, Mass.

Flexalarm is a special line of fire alarm signal systems designed for general industrial, commercial and institutional applications. It features a new building-block concept, based on Gamewell experience in signaling and communications — allowing the architect, engineer, and user to tailor a fire alarm system exactly to needs . . . for maximum protection at minimum cost.

New Design Sprays Water More Evenly Over Wider Area!

It's hard to improve on the best, but we've done it! By re-designing our already superior "Automatic" Spray Sprinkler, we have come up with a model that has an even *better* distribution pattern. We also made the casting more rugged. The resultant increase in efficiency means better performance in case of fire. While we were at it, we improved our sprinkler's appearance.

Available for upright or pendant installation.

Ask your nearest "Automatic" Sprinkler fire safety engineer or write to us for complete information.

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN, OHIO
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"Automatic" Sprinkler

FIRST IN FIRE PROTECTION

LITTLE ROCK, ARK., REPORTS...

Fire Chief Gann Nalley, and Mayor Mann, welcome the modern Gamewell Fire Alarm system installed to protect the lives and property of their fast-growing community.

Lowest Yearly Cost, Reduced Insurance Rates with New GAMEWELL SYSTEM

On April 14, 1956, Little Rock joined the ever-increasing list of communities which have thoroughly investigated all types of fire alarm systems — and selected Gamewell. Here is what they found:

- Average annual cost would be as much as 2½ times cheaper than leased voice type service.
- Gamewell system sets into operation, automatically, the dispatching facilities for the entire fire defenses — including all required central office equipment. The fire alarm system is tailored exactly to the Fire Chief's needs and city's fire defense plan.
- It contributes to improvement of city's fire insurance rating from Class IV to III — a saving to property owners of some $100,000 a *year!*

This new 202-box system was planned for coverage of high value districts and will be expanded to protect the fast-developing outlying areas — additional boxes quickly added at very low cost.

Get ALL The Facts! You can bring these same advantages to *your* community. Just ask for a FREE Gamewell Survey. And, most important, be sure you have *all* the facts on costs and completeness of vital municipal fire alarm protection — send for the Gamewell Booklet, "Conversation or Organization". Write:

FIRE FACTS

in Little Rock

Original Gamewell system served efficiently for 42 years. 202 new boxes located in high value districts.

Average of 25 boxes per square mile of built-up area.

Class A Form 4 switchboard, with operator's console, Loud Speaker Inter-communication and paging system serving 11 fire stations, and fire station recording and alarm sounding equipment.

Industrial plants to be safeguarded through Gamewell "Master Box Plan" for extra protection of warehouse and industrial plants.

Complete system installed, depreciated and maintained for less than $70.00 per box per year. Additional boxes can be installed and maintained for substantially less than this figure.

Remember-a Gamewell System is FIRST when seconds count!

THE GAMEWELL COMPANY
Newton Upper Falls 64
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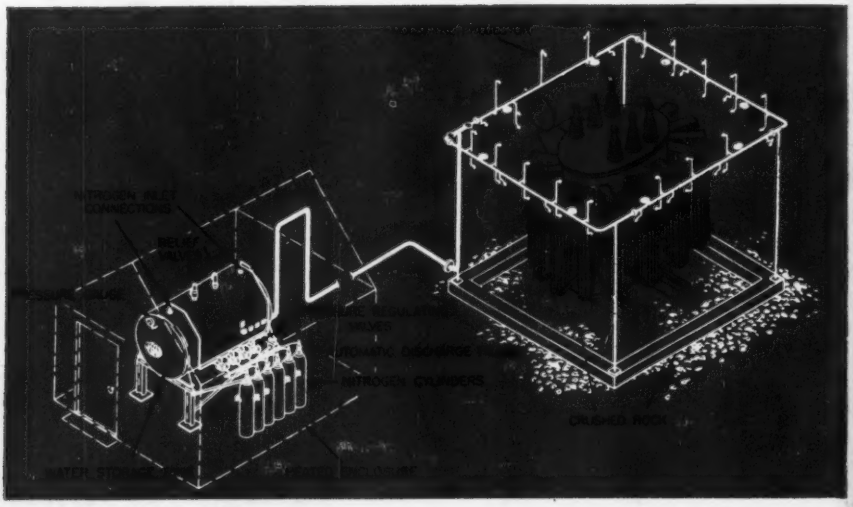
GAMEWELL®

THE BOX IS POSITIVE — REDUCES HUMAN ERROR

Grinnell Mulsifyre Protection with a Limited Water Supply

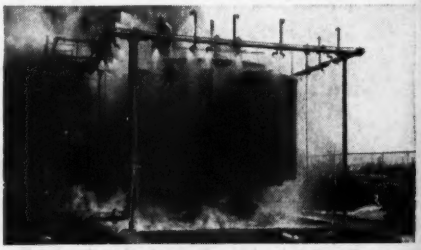


You need no longer be without water spray protection simply because your hazard is distant from city water mains. Grinnell's new limited water supply Mulsifyre System provides automatic detection and prompt water spray protection in extinguishing fires while still small, and in preventing their spread with possibly serious damage.

Water spray protection, of course, presupposes water under pressure. Grinnell's limited water supply system successfully achieves this through the use of nitrogen gas, stored in cylinders under high pressure, which drives the water from the storage tank at spray-forming velocities. As with all Grinnell Fire Protection Systems, the component parts of the limited water supply Mulsifyre System are fully listed by Underwriters' Laboratories and meet specifications covered in NBFU and NFPA Standards.

Your particular hazard will be thoroughly analyzed by the Grinnell Fire Protection Division, which introduced water spray protection in America — and has the widest possible background experience in its use. Full consideration will be given to the property to be protected, as well as to all other adjacent exposure hazards.

Let a Grinnell Fire Protection Engineer tell you more about this system. Grinnell Company, Inc., 274 West Exchange Street, Providence, Rhode Island. Branch offices in principal cities.



A Grinnell limited water supply Mulsifyre System operating to extinguish fire under test conditions.

GRINNELL *Mulsifyre*

EMULSION EXTINGUISHMENT OF OIL FIRES